U.S. Department of Transportation

Federal Highway Administration

INTELLIGENT TRANSPORTATION SYSTEM OPERATIONAL TEST PROGRAM

Commercial Vehicle Operational Tests

Project Overviews

ITS Operational Test Program

February 5, 1996

CONTENTS

CVO Test & Evaluation Strategies

- Expedited Processing and International Crossing (EPIC)

- International Border Electronic Clearance (IBEX)

- Oregon Green Light

- Tranzit XPress

CVO Program Completion Plans

- Advantage I-75 Mainline Automated Clearance System (MACS) Operational Test

- Automated Mileage and Stateline Crossing Operational Test (AMASCOT)

- Commercial Vehicle Operations One-Stop Electronic Purchasing and Processing

- Dynamic Downhill Truck Speed Warning System (DTSW)

- Idaho Commercial Vehicle Out-of-Service Verification Operational Test

- Midwest States Electronic Credential One-Stop Operational Test

- Southwest Electronic One-stop Shopping Field Operational Test (EOSS)

- Wisconsin-Minnesota Out-of-Service Operational Test (WI/MN OOs)

Volume I-Commercial Vehicle Operational Tests

TEST AND EVALUATION STRATEGIES

U.S. Department of Transportation
Federal Highway Administration

EXPEDITED PROCESSING AND INTERNATIONAL CROSSING

(EPIC)

Test & Evaluation Strategy

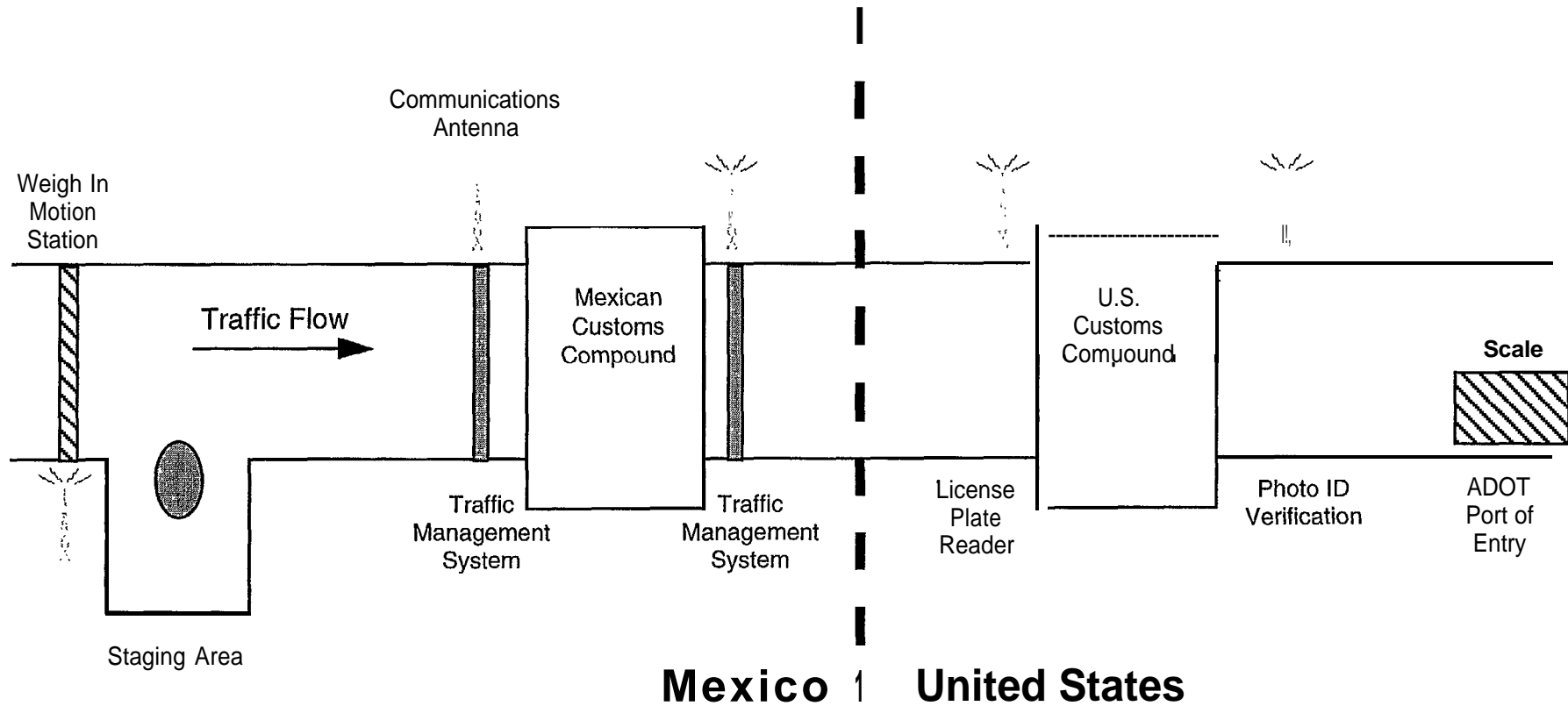**ITS Operational Test Program**

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

THE EPIC PROJECT WILL DEMONSTRATE AN ELECTRONIC TRIP CLEARANCE SYSTEM TO ACCELERATE COMMERCIAL VEHICLE TRAFFIC THROUGH THE NOGALES, ARIZONA BORDER CROSSING SITE

- The objective of the EPIC Project is to expedite commodity movements through the extensive use of EDI and the automation of manual processes currently used to monitor commercial vehicle movements at the border

- The EPIC system will demonstrate:
    - Integrated pre-clearance processing for cargo, vehicle, and driver
    - Electronic Data Interchange (EDI) transfer of regulatory data
    - Use of License Plate Recognition (LPR) and Vehicle-Roadside Communications (VRC) as a part of the line release system
    - Use of electronic seals to ensure cargo integrity
    - Traffic management systems to reduce overall delays
    - Methods for reducing institutional and legal barriers

THE EPIC PROJECT WILL REQUIRE INTERNATIONAL COORDINATION OF INFRASTRUCTURE INSTALLATION, OPERATION, AND MAINTENANCE

Communications
Antenna

Weigh In
Motion
Station

Traffic Flow

Mexican
Customs
Compound

U.S.
Customs
Compound

Scale

Traffic
Management
System

Traffic
Management
System

License
Plate
Reader

Photo ID
Verification

ADOT
Port of
Entry

Staging Area

Mexico ⏐ **United States**

THE COMMERCIAL VEHICLE ELECTRONIC CLEARANCE USER SERVICE WILL BE THE FOCUS OF THIS OPERATIONAL TEST

SYSTEMS
- Electronic Data Interchanges (EDI)
· Vehicle-Roadside Communications MC)
· Commercial Drivers License Information System (CDLIS)
0 License Plate Recognition (LPR)
· Weigh in Motion (WIM)
· SafetyNet
· Management Information System for Transportation (MIST)

SERVICES
• Driver Processing-Expedite identification of driver and cross-check driver credentials with National and local databases at the U. S. Customs entry gate, Drug Enforcement Agency (DEA) inspection station, and ADOT Port of Entry.
• Vehicle Processing--Automate verification of vehicle registration, trip permits, and safety credentials through the use of license plate recognition (LPR) and weigh in motion (WIM) at the U. S. Customs entry gate, Drug Enforcement Agency (DEA) inspection station, and ADOT Port of Entry.
• Cargo Processing--Automate the transfer of information residing in the Automated Customs System (ACS) database at the U. S. Customs entry gate, Drug Enforcement Agency (DEA) inspection station, and ADOT Port of Entry, and enhance cargo integrity and security.
• Traffic Management-Control Infrastructure metering scheme in accordance with line release priority system and support vehicle and cargo tracking.

THE EPIC WORK PLAN IS COMPRISED OF 5 SEQUENTIAL PHASES TO ACHIEVE EARLY/INCREMENTAL ACCOMPLISHMENTS

- Phase O-Project Initiation

- Phase 1 -System Prototyping

- Phase 2-Trip Permitting Implementation

- Phase 3-Cargo Seals and WIM Implementation

- Phase 4-Traffic Management System Implementation

The EPIC operational test work plan will be refined based on the outcome of international coordination efforts and the resolution of technical issues addressed in Phase 0

PHASE 0 IS COMPRISED OF THREE MAJOR ACTIVITIES CULMINATING IN A REFINED WORK PLAN FOR THE PROJECT

- Analyze Border Crossing Requirements
  - Initiate policy discussions through International Border Clearance Planning and Deployment Committee (IBCPDC)
  - Review current infrastructure and planned improvements
  - Determine liaisons and roles of U.S. and Mexican Customs and Immigration
  - Determine liaisons and roles of U.S. and Mexican Transportation Officials
  - Define roles of other participants (e.g., brokers, importers, exporters, etc.) Officials

- Finalize System Needs and Requirements
  - Develop functional requirements for trip clearance and traffic management
  - Develop infrastructure concept plan
  - Refine system architecture

- Finalize Operational Test Work Plan

The revised work plan will focus the operational test design based on results of Phase 0 investigations of technical and institutional aspects

PHASE 1 IS COMPRISED OF SIX MAJOR ACTIVITIES TO DEFINE THE SYSTEM PROTOTYPE

- Develop Preliminary System Design
  - – Define driver, vehicle, and cargo clearance information processing subsystems
  - – Define trip information processing and service center subsystems
  - – Define databases, communications network, interfaces, and control subsystems
  - – Define system architecture

a Develop Preliminary Operational Procedures
  - – Define enrollment and trip clearance procedures
  - – Define agency protocols

· Recruit Test Participants

· Develop Installation Plans
  - – Procure equipment and prepare site plans

· Install License Plate Recognition (LPR) and Vehicle-to-Roadside Communications (VRC) Devices

· Develop Prototype Graphical User Interfaces (GUIs)
  - – Service Center users
  - – U. S. Customs agents
  - – Immigration and Naturalization Service (INS) agents
  - – ADOT Safety and Special agents

This phase will result in a demonstration of the prototype GUIs and the L PR/VRC technologies at the test site

PHASE 2 IS COMPRISED OF SEVEN MAJOR ACTIVITIES TO IMPLEMENT TRIP PERMITTING

- Develop Phase 2 System Design
    - Design driver, vehicle, and cargo clearance information processing subsystems
    - Design trip information processing and service center subsystems
    - Design databases, communications network, interfaces, and control subsystems
    - Update system architecture

- Develop Phase 2 System
    - Develop driver, vehicle, and cargo clearance information processing subsystems
    - Develop trip information processing and service center subsystems
    - Develop initial Electronic Data Interchanges (EDls)
    - Develop, integrate, and test communications network, interfaces, and control subsystems

- Develop Installation Plans
    - Procure equipment and prepare installation plans

- Install Central Control, Traffic Control, and Communications Infrastructure/Equipment

- Phase 2 System Integration and Testing

- Prepare for Phase 2 Operations
    - Establish service center and initial databases
    - Update operational procedures, and enroll/train participants
    - Verify driver and vehicle data and install VRC transponders

- Conduct Phase 2 System Test

This phase will result in a demonstration of trip permitting capabilities using installed components and participating vehicles

PHASE 3 IS COMPRISED OF SIX MAJOR ACTIVITIES TO IMPLEMENT CARGO SEALS AND WIM

- Develop Phase 3 System Design
  - Design cargo interface and additional EDIs
  - Refine Weigh-In-Motion (WIM) interface
  - Update system architecture
  - Finalize equipment requirements

- Develop Phase 3 System
  - Develop cargo interface and additional EDIs
  - Integrate and test subsystems

- Develop Installation Plans
  - Procure equipment and prepare installation plans

- Phase 3 System Integration and Testing

- Prepare for Phase 3 Operations
  - Update operational procedures and enroll/train participants
  - Install cargo and VRC transponders
  - Update databases

- Conduct Phase 3 System Test

This phase will demonstrate an integrated cargo security system using installed infrastructure components and participating vehicles
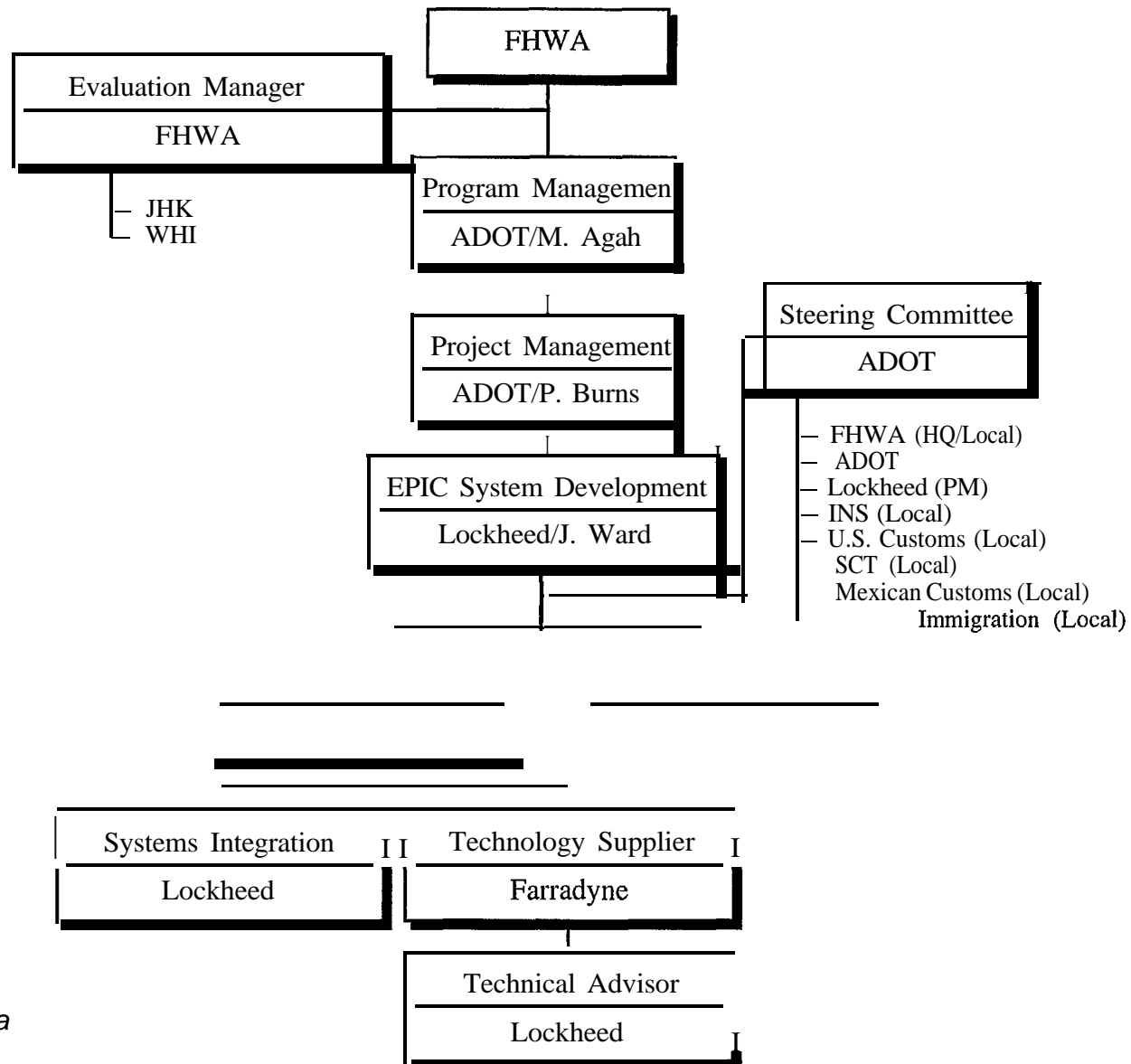
PHASE 4 IS COMPRISED OF SEVEN MAJOR ACTIVITIES TO IMPLEMENT TRAFFIC MANAGEMENT

0   Develop Phase 4 System Design
- Update traffic management requirements
- Design traffic management control algorithms
- Finalize traffic management system design
- Finalize system architecture

-    Develop Phase 4 System
- Develop interfaces to traffic control devices
- Develop traffic management control algorithms
- Integrate and test subsystems

-    Develop Installation Plans
- Procure equipment and prepare installation plans

- Install Traffic Control and Communications Equipment

0   Phase 4 System Integration and Testing

- Prepare for Phase 4 Operations
- Finalize operational procedures and train operators

- Conduct Phase 4 System Test

This phase will demonstrate an integrated EPIC system which incorporates the traffic management control system . . . the operational test evaluation will commence at the end of this phase

THE PROJECT TEAM IS LED BY ARIZONA DOT AND LOCKHEED IMS - THE EVALUATION WILL BE MANAGED BY FHWA

FHWA

Evaluation Manager
FHWA

— JHK
— WHI

Program Managemen
ADOT/M. Agah

Project Management
ADOT/P. Burns

Steering Committee
ADOT

EPIC System Development
Lockheed/J. Ward

— FHWA (HQ/Local)
— ADOT
— Lockheed (PM)
— INS (Local)
— U.S. Customs (Local)
SCT (Local)
Mexican Customs (Local)
Immigration (Local)

Systems Integration
Lockheed

Technology Supplier
Farradyne

Technical Advisor
Lockheed

THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can advanced technologies be applied in such a way to make it possible for commercial vehicles to cross international borders without stopping?

- Can common (Customs, INS, DOT) international border crossing processes and information requirements be developed and implemented between the U.S. and Mexico?

- Will border inspectors allow electronic systems verifications of cargo, driver, and vehicle entry and exit requirements to replace manual process, except in the case of random inspections?

EVALUATION GOALS AND OBJECTIVES:

GOALS	OBJECTIVES
Assess system benefits to users and providers	• Assess reduction in inspection process delays for commercial vehicle border crossing • Assess the increase in verification of cargo integrity • Assess the improvement in motor carrier productivity using an automated, electronic information verification system
Evaluate effects of Institutional & Legal Issues	• Reduce institutional barriers to efficient border crossing • Facilitate motor carrier regulatory and safety compliance
Assess system performance	• Assess impacts of interface control documents, including levels of communications protocols, data structures, and databases
Assess user acceptance	• Assess ease of use
Assess impacts on the transportation system	• Assess impacts on surrounding vehicle border crossing efficiency
Document system costs to users and providers	• Document infrastructure, equipment, and training costs

THE PROJECT SCHEDULE:

Task	1995				1996												1997					
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
P0—Project Initiation	■	■																				
Analyze border crossing requirements	■																					
Finalize system needs and requirements	■	■																				
Finalize operational test work plan		■																				
P1—System Prototyping		■	■	■	■																	
Develop preliminary system design		■	■	■	■																	
Develop preliminary operational procedures		■	■																			
Recruit test participants			■	■	■																	
Develop installation plans		■	■	■																		
Install LPR and VRC devices					■																	
Develop prototype GUIs					■																	
P2—Trip Permitting Implementation					■	■																
Develop Phase 2 system design					■	■																
Develop Phase 2 system						■	■	■	■													
Develop installation plans						■																
Install central control, traffic control, infrastructure, and communications equipment							■	■														
Phase 2 system integration and test ing								■	■													
Prepare for Phase 2 operations						■	■	■	■													
Conduct Phase 2 System Test										■												
P3—Cargo Seals and WIM Implementation										■	■	■	■									
Develop Phase 3 system design										■												
Develop Phase 3 system										■	■	■	■									
Develop installation plans										■												
Phase 3 system integration and testing												■	■									
Prepare for Phase 3 operations										■	■	■	■									
Conduct Phase 3 System Test													■									
P4—Traffic Management System Implementation										■	■	■	■	■								
Develop Phase 4 system design										■	■											
Develop Phase 4 system											■	■	■									
Develop installation plans												■	■									
Install traffic control and communications equipment														■								
Phase 4 system integration and testing														■								
Prepare for Phase 4 operations														■	■							
Conduct Phase 4 System Test																■						
Evaluation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Evaluation planning	■	■	■	■																		
Evaluation Plan						■	■															
Test Plans										■	■	■										
Conduct tests															■	■	■	■	■			
Test Reports																■	■	■	■	■		
Evaluation Report																	■	■	■			

U.S. Department of Transportation
Federal Highway Administration

INTERNATIONAL BORDER ELECTRONIC CLEARANCE

(IBEX)

Test & Evaluation Strategy

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
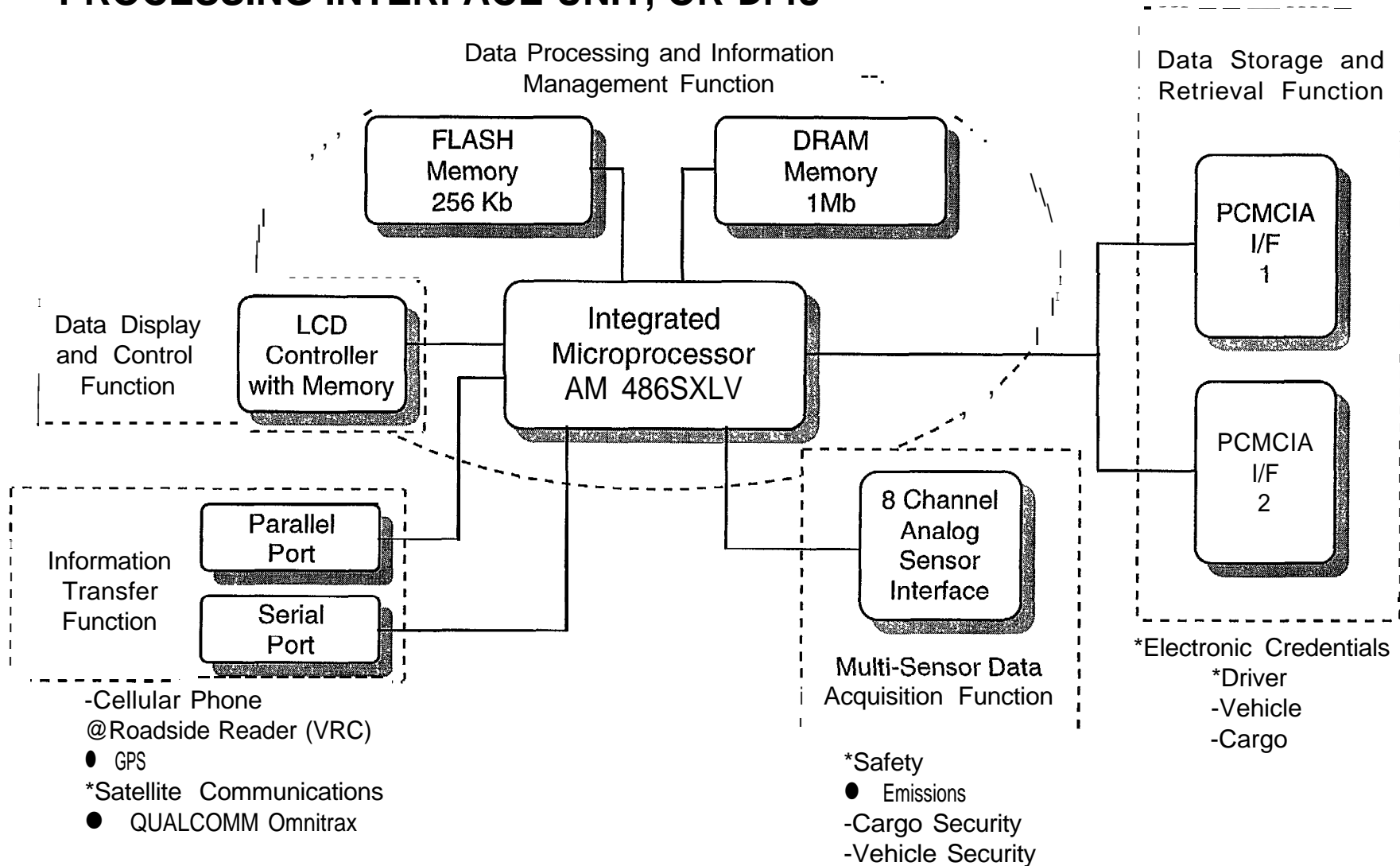- Evaluation Overview
- Schedule

THE IBEX PROJECT WILL DEMONSTRATE AN ELECTRONIC BORDER CLEARANCE SYSTEM TO ACCELERATE COMMERCIAL VEHICLE TRAFFIC THROUGH THE OTAY MESA, CALIFORNIA CROSSING SITE

- The objective of the CVO Preclearance System for International Border Crossings is to provide an accredited service to both the border officials/agencies and commercial fleet users that allows selected vehicles to pass the international border check points without stopping, or with expedited inspections

- The Southern California partnership intends to employ and integrate off-the-shelf components to perform the following functions:
    - Automatic Vehicle Identification (AVI)
    - Automatic Vehicle Classification (AVC)
    - Automatic Credential Verification (ACV)
    - Vehicle/Cargo Monitoring
    - Safety and Environmental Monitoring

- The IBEX system design will accommodate HELP/Crescent/Advantage I-75 technologies and will support future hardware/software integration

- The IBEX system will emphasize decentralized data bases and more robust on-board capability, but will keep inspectors firmly in the process

THE IBEX SYSTEM WILL CONSIST OF PROVEN COMPONENTRY INTEGRATED INTO AN OPEN ARCHITECTURE
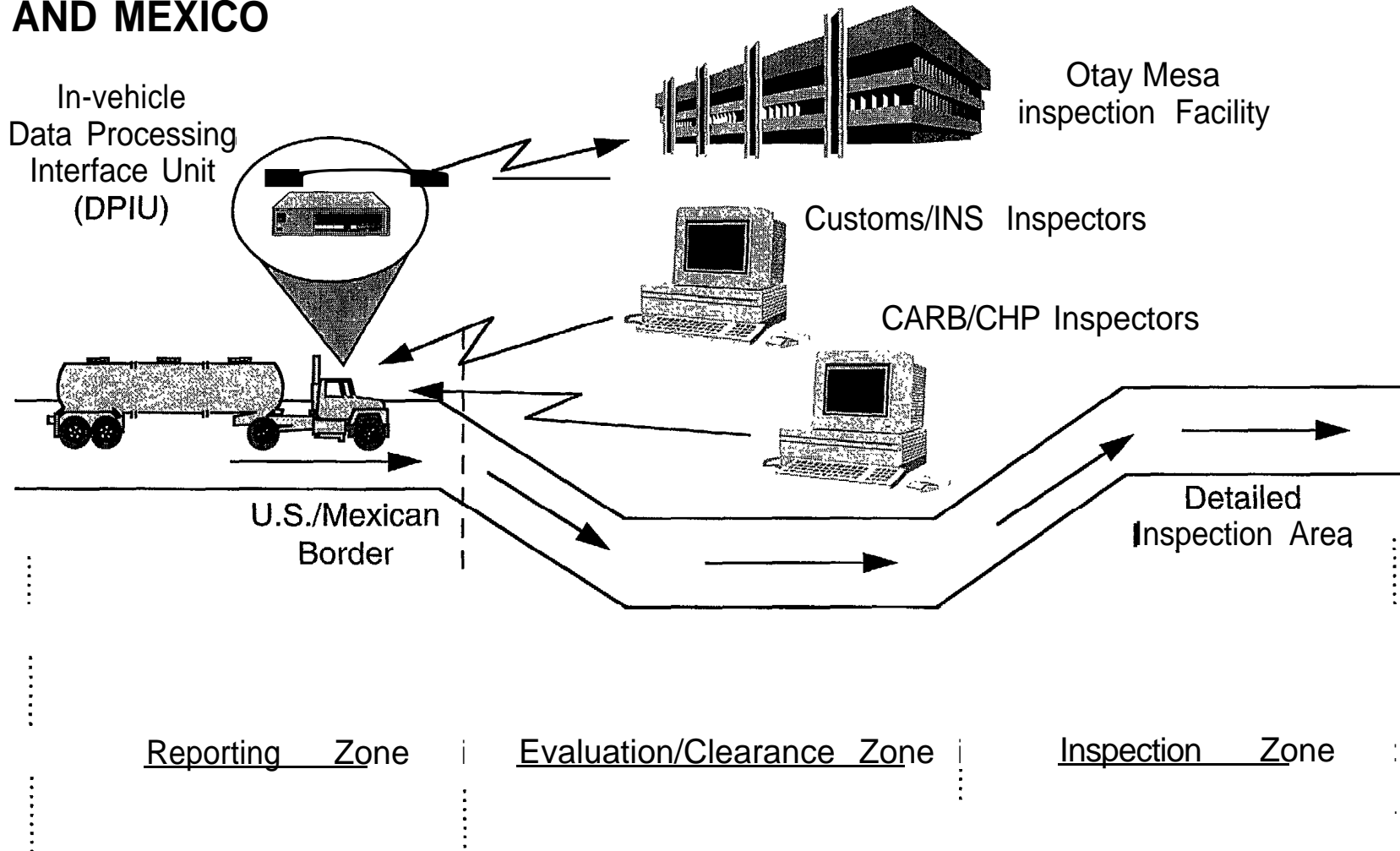
- In-Vehicle Data Processing Interface Unit (DPIU)
    - Carries/provides credentials, manifest, inspection records
    - Collects/processes/transmits data from on-board sensors
    - Upstream transmission of credential information to Otay Mesa Inspection Facility
    - Vehicle to Roadside Communications (VRC) with inspectors and inspection stations
    - Information management of in-vehicle data base and records

- Personal Computer (PC)-Based Inspector Workstations
    - Interface to DPIU via VRC
    - Record of electronic credentials (vehicle and cargo)
    - Data base interfaces (e.g., HELP/Crescent) with Otay Mesa Inspection Station
    - Customs/INS and CARB/CHP Inspectors linked via network

- Communications
    - Cellular Modem
    - Hughes, MK IV, etc., VRC systems

- Automatic Vehicle Locating
    - GPS-based

THE HEART OF THE IBEX SYSTEM IS THE IN-VEHICLE DATA PROCESSING INTERFACE UNIT, OR DPIU

Data Processing and Information
Management Function

Data Storage and
Retrieval Function

FLASH
Memory
256 Kb

DRAM
Memory
1Mb

PCMCIA
I/F
1

Data Display
and Control
Function

LCD
Controller
with Memory

Integrated
Microprocessor
AM 486SXLV

PCMCIA
I/F
2

Information
Transfer
Function

Parallel
Port

Serial
Port

8 Channel
Analog
Sensor
Interface

-Cellular Phone
@Roadside Reader (VRC)
● GPS
*Satellite Communications
● QUALCOMM Omnitrax

Multi-Sensor Data
Acquisition Function

*Electronic Credentials
*Driver
-Vehicle
-Cargo

*Safety
● Emissions
-Cargo Security
-Vehicle Security

THE IBEX PROJECT WILL REQUIRE THE INTEGRATION OF EXISTING TECHNOLOGIES INTO A SEAMLESS SYSTEM THAT MEETS THE OPERATING AND INSTITUTIONAL REQUIREMENTS OF BOTH THE U.S. AND MEXICO

In-vehicle
Data Processing
Interface Unit
(DPIU)

Otay Mesa
inspection Facility

Customs/INS Inspectors

CARB/CHP Inspectors

U.S./Mexican
Border

Detailed
Inspection Area

Reporting   Zone   Evaluation/Clearance Zone   Inspection   Zone

IBEX WILL DEPLOY INTEGRATED SYSTEMS TO PROVIDE USER SERVICES IN FOUR AREAS

SYSTEMS
- VRC Network   - Two-Way Digital and Voice Communications   - Distributed Database   - In-Vehicle Data Processing (DPIU)   - On-Board Driver/Vehicle Safety Monitoring Devices   – Linked to DPIU   – Data Transfer Via VRC   - GPS

SERVICES
- Commercial Vehicle Electronic Clearance and Administrative Processes   – Driver Validation   – Electronic Driver Credentials   – Vehicle Identification   – Electronic Pre-Clearance   – Cargo Monitoring   - Automated Roadside Safety Inspection   – Real-time downloading of data from on-board sensors   – Continuously updated safety record database   - On-Board Safety Monitoring   – Safety monitoring equipment data stored in DPIU and transmitted via VRC   - Commercial Fleet Management   – GPS-based vehicle location, itinerary validation

THE IBEX WORK PLAN IS COMPRISED OF 6 PHASES

- Phase O-System Analysis and Design
- Phase 1 -Southbound System Development
- Phase 2-Southbound Demonstration
- Phase 3-NATAP Customs Interface
- Phase 4-Full Demonstration
- Phase 5-Evaluation

The IBEX operational test work plan will be refined based on the outcome of international coordination efforts and the resolution of technical issues addressed in Phase 0

PHASE 0 IS COMPRISED OF FIVE MAJOR ACTIVITIES CULMINATING IN A REFINED WORK PLAN FOR THE PROJECT

- Problem Definition
  - Analyze northbound and southbound traffic flow
  - Define process/identify potential delays
  - Identify problems and potential solutions

- Agency Coordination
  - Convene Institutional and Legal Issues Coordination Committee (ILCC)
  - Coordinate policy discussions with International Border Clearance Planning and Deployment Committee (IBCPDC)
  - Identify liaisons and roles of US. and Mexican Customs and Immigration
  - Identify liaisons and roles of U.S. and Mexican Transportation Officials
  - Define specific roles of other participants

- Determine Information Requirements
  - Reconcile needs and restrictions imposed by U.S. and Mexican Officials

- Develop Preliminary System Design
  - Finalize system functional requirements
  - Refine system architecture

- Develop Evaluation Strategy
  - Select Independent Evaluator

The revised work plan will focus the operational test design based on results of Phase 0 investigations of technical and institutional aspects

PHASE 1 IS COMPRISED OF ACTIVITIES TO DESIGN AND DEVELOP THE SYSTEM PROTOTYPE

- Systems Engineering
  - Define interface control requirements

- In-Vehicle System Hardware and Software Selection and Design
  - Select and procure hardware components
  - Conduct software requirements analysis
  - Design, develop, and test software

- Main Station Hardware and Software Selection and Design
  - Select and procure hardware components
  - Conduct software requirements analysis
  - Design, develop and test software

- Roving and Broker Unit Hardware and Software Selection and Design
  - Select and procure hardware components
  - Conduct software requirements analysis
  - Design, develop and test software

- Integration and Test
  - System installation and test at contractor facility

- Test Planning and Manuals
  - Planning for system integration and test task
  - Development of user's manuals for main station, roving unit, broker unit, and in-vehicle unit

  This phase will result in a laboratory demonstration of the prototype system , and publishing of system design, installation, and operations documents

PHASE 2 WILL FOCUS ON FIELD DEPLOYMENT AND DEMONSTRATION OF THE SOUTHBOUND SYSTEM

- Main Station Production
  - Single set of equipment for installation at central customs

- In-Vehicle Production
  - Seventy-five sets of in-vehicle equipment

- Roving/Broker Unit Production
  - Five sets each

- Installation (and Removal)
  - Main station
  - In-vehicle
  - Broker/shipper facilities

- Systems Testing
  - Two-week demonstrations and testing period

This phase will demonstrate the functionality of a portion of the IBEX system, and will serve as a pilot test for evaluation data collection procedures

PHASE 3 WILL FOCUS ON ENSURING THE IBEX SYSTEM IS FULLY COMPATIBLE WITH THE NORTH AMERICAN TRADE AUTOMATION PROTOTYPE (NATAP)

- NATAP will identify a standard set of data for all trade transactions between Canada, U.S., and Mexico

- Specific tasks and a schedule will be identified once IBEX system is defined and NATAP requirements have been developed

PHASE 4 WILL BE COMPRISED OF A FULL DEMONSTRATION OF ALL IBEX SYSTEM CAPABILITIES
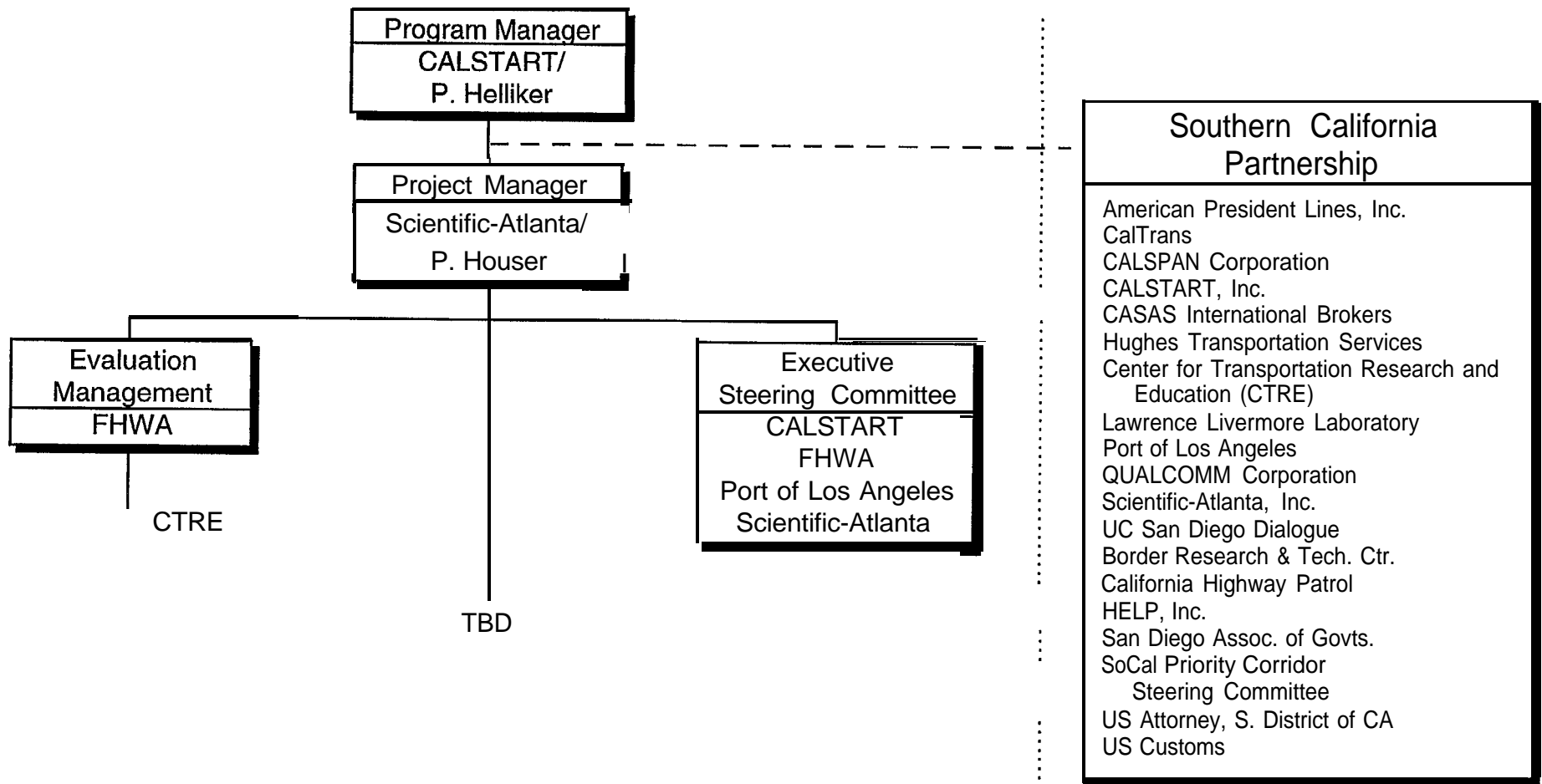
- All components and services will be exercised in an end-to-end functional demonstration

- Will allow for isolation and correction of technical difficulties, and for participants to become familiar with operating procedures

- Will serve as a kick-off for the start of evaluation data collection activities

PHASE 5 WILL CONSIST OF AN OPERATIONAL TEST EVALUATION

- Evaluation Plan Development

- Evaluation Plan Validation
    - Pilot tested during Phase 2

- Data Collection
    - To be defined in individual test plans

- Data Analysis
    - Assessment of system impacts
        - Comparison with design goals
    - Assessment of system technical adequacy
        - Hardware
        - Software
        - Component compatibility
        - System suitability
        - System extendibility

- Evaluation Reporting
    - Test Reports
    - Final Evaluation Report

THE PROGRAM IS HEADED BY CALSTART-THE EVALUATION WILL BE MANAGED BY FHWA

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┌─────────────────────┐
│  Program Manager    │
├─────────────────────┤
│     CALSTART/       │
│     P. Helliker     │
└─────────────────────┘
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┌──────────────────────────────────────┐
│   Southern California   │
│   Partnership   │
├──────────────────────────────────────┤
│ American President Lines, Inc.   │
│ CalTrans   │
│ CALSPAN Corporation   │
│ CALSTART, Inc.   │
│ CASAS International Brokers   │
│ Hughes Transportation Services   │
│ Center for Transportation Research and│
│   Education (CTRE)   │
│ Lawrence Livermore Laboratory   │
│ Port of Los Angeles   │
│ QUALCOMM Corporation   │
│ Scientific-Atlanta, Inc.   │
│ UC San Diego Dialogue   │
│ Border Research & Tech. Ctr.   │
│ California Highway Patrol   │
│ HELP, Inc.   │
│ San Diego Assoc. of Govts.   │
│ SoCal Priority Corridor   │
│   Steering Committee   │
│ US Attorney, S. District of CA   │
│ US Customs   │
└──────────────────────────────────────┘

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┌─────────────────────┐
│  Project Manager    │
├─────────────────────┤
│  Scientific-Atlanta/│
│     P. Houser       │
└─────────────────────┘

┌─────────────────┐          ┌──────────────────────┐
│   Evaluation    │          │     Executive        │
│   Management    │          │  Steering Committee  │
├─────────────────┤          ├──────────────────────┤
│      FHWA       │          │      CALSTART        │
└─────────────────┘          │        FHWA          │
                             │  Port of Los Angeles │
       CTRE                  │   Scientific-Atlanta │
                             └──────────────────────┘

       TBD
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THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can advanced technologies be applied in such a way to make it possible for commercial vehicles to cross international borders without stopping?

- Can common (Customs, INS, DOT) international border crossing processes and information requirements be developed and implemented between the U.S. and Mexico?

- Will border inspectors accept electronic systems verifications of cargo, driver, and vehicle inspections, or in conjunction with manual inspection process?

EVALUATION GOALS AND OBJECTIVES:

GOAL	OBJECTIVES
To evaluate the benefits of the CVO IPS system in reducing border congestion, speeding the movement of commerce and enhancing the law enforcement/regulatory process	- To evaluate the use of a DPIU as an integrating technology - To evaluate the various VRC methods as to their capacity to support international electronic border clearance - To evaluate the effectiveness of communications and data security in supporting electronic clearance - To evaluate the best means of transferring credentials between inspectors, shippers, brokers and underway vehicles - To evaluate electronic means to update in-vehicle credentials and central data base files - To evaluate on-board safety, driver and environmental sensors/outputs - To evaluate means of automating Customs/INS/CARB/CHP forms necessary for pre-clearance - To evaluate the most efficient way to store pre-clearance data on commercial vehicles - To evaluate the most efficient display of data to inspectors to facilitate pre-clearance - To identify external data bases which could support electronic clearance at the international border - To evaluate truck driver usage and acceptance of the system - To evaluate the use of long-range satellite communications to support border clearance - To identify and evaluate new requirements for U.S. and Mexican inspectors necessary to support electronic pre-clearance - To identify innovative ways to expand me-clearance beyond the immediate border region - To evaluate the integration of the CVO IPS technology with the HELP/Crescent/EZ Pass/Advantage I-75 systems - To evaluate the application of CVO IPS technology across all North American international borders - To determine the path to commercialization of this technology - To bring together the critical institutional players and overcome institutional roadblocks to executing a system demonstration and eventual commercialization - To develop specific forums and publications beyond the test report to share lessons learned and technical approaches to electronic border crossing - To evaluate sensors and approaches to vehicle self-monitoring as a means of meeting safety and environmental regulations - To evaluate a means of "port-to-port" electronic bonding and cargo tracking

THE PROJECT SCHEDULE:

	1995			1996												1997		
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Phase 0 - System Analysis and Design																		
Program Management	██	██																
Problem Definition	██																	
Information Requirements	██	██																
Preliminary System Design	██	██																
Develop Evaluation Strategy	██	██	██															
Agency Coordination	██	██	██															
Phase 1 -Southbound System Development																		
Systems Engineering			██	██														
Vehicle System HW/SW Selection/Design				██	██	██												
Main Station HW/SW Selection/Design				██	██	██												
Roving/Broker Unit HW/SW Selection/Design				██	██	██												
Integration and Test							██	██										
Test Planning and Manuals																		
Phase 2 - Southbound Demonstration																		
Main Station Production									██	██								
In-Vehicle Unit Production									██	██								
Roving/Broker Unit Production									██	██								
Installation												██						
Systems Testing													██					
Phase 3 - NATAP Customs Interface																		
Phase 4 - Full Demonstration		SCHEDULE TO BE DETERMINED																
Phase 5 - Evaluation																		
Evaluation Plan Development						██	██	██	██									
Evaluation Plan Validation													██					
Data Collection															██	██		
Data Analysis																	██	
Evaluation Reporting																		██

*This schedule will be updated based on the results of the Phase 0 activities

OREGON GREEN LIGHT

Test & Evaluation Strategy

ITS Operational Test Program
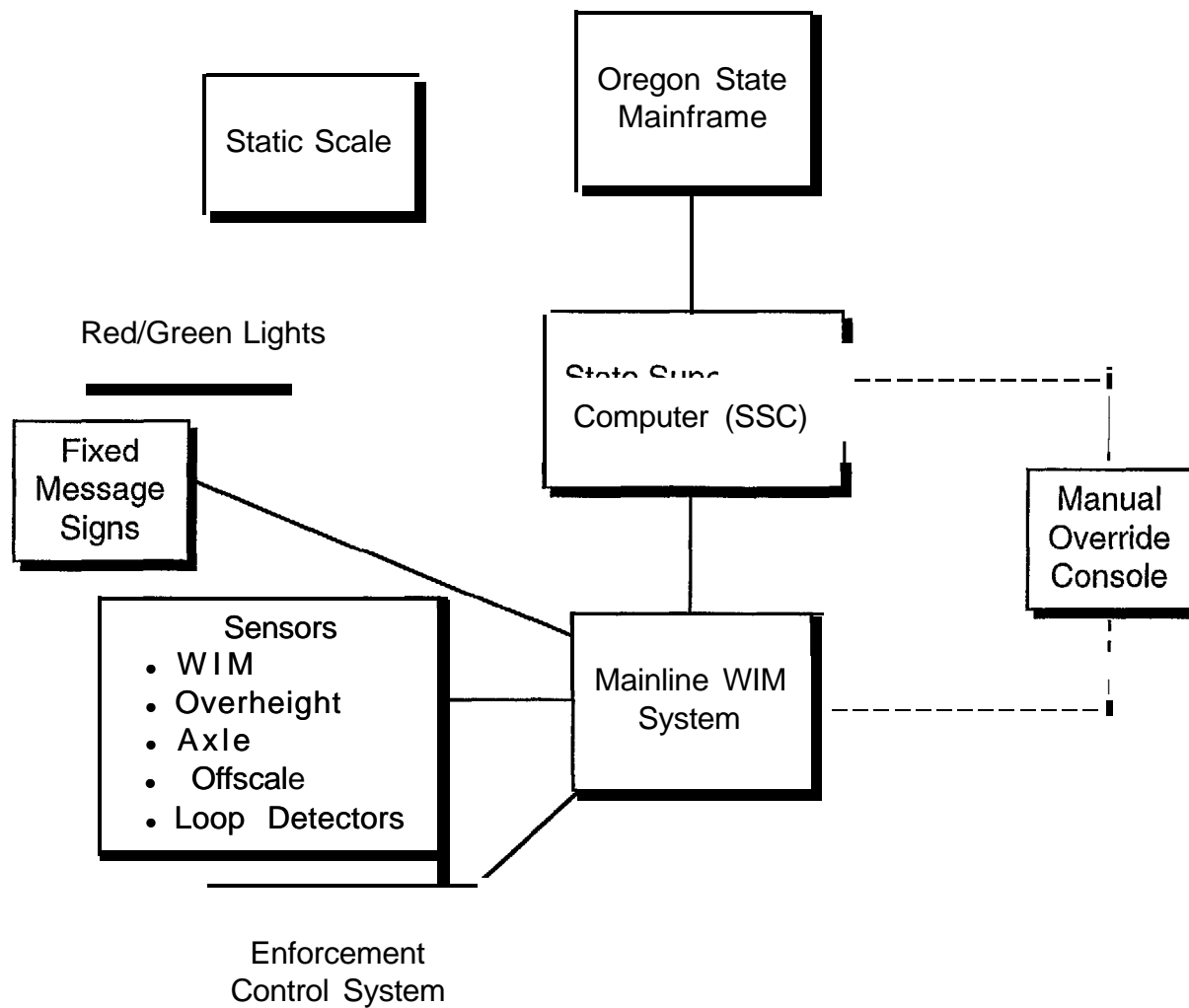
February 5,1996
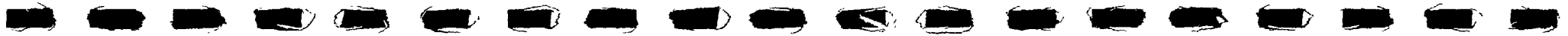
CONTENTS

- Project Overview
- Organization
- Evaluation Overview
. Schedule

THE GREEN LIGHT PROJECT WILL DEVELOP AND DEPLOY ADVANCED TECHNOLOGY TO AUTOMATE COMMERCIAL VEHICLE OPERATIONS (CVO) IN OREGON

- The project will automate three CVO areas:
  - Mainline Preclearance
  - Enforcement
  - Safety

- Mainline preclearance systems will be implemented at 15 sites on Oregon's major highways (Phase I). These systems will allow compliant commercial vehicles to completely by-pass ports-of-entry and weigh stations

- Enforcement sites, located at key by-pass routes (primary and secondary roads), will be equipped with WIM and/or AVI to assist in identifying vehicles attempting to evade weigh stations. Thirty-five potential sites have been identified for construction as part of Phase II of the project

- Safety enhancements will be installed in four locations. These enhancements consist of two systems:
  - Downhill Speed Information System (DSIS)-Measures the speed versus weight of passing trucks and provides safe operating speed indication via variable message signs
  - Road and Weather Information System (RWIS)-Detects visibility, wind, and ice problems to allow state maintenance crews to more effectively mitigate snow and ice problems
  - Link existing real-time safety inspection database to all weigh stations

- The project will purchase 5000 transponders and offer them free to truck operators to establish a high level of initial participation in this project

THE PROJECT WILL EQUIPPED 14 SITES FOR MAINLINE PRECLEARANCE AND ALL OF THE SITES WILL BE INTEGRATED WITH THE STATE SYSTEM

Static Scale

Oregon State Mainframe

Red/Green Lights

State Supe
Computer (SSC)

Fixed Message Signs

Manual Override Console

Sensors
- WIM
- Overheight
- Axle
- Offscale
- Loop Detectors

Mainline WIM System

Enforcement Control System

THE PROJECT ELEMENTS WILL BE DEPLOYED IN A THREE-PHASED APPROACH SUBJECT TO AVAILABILITY OF FUNDS FOR THE LATER PHASES

- Phase I
    - Mainline preclearance (sites have been prioritized)
    - Downhill Speed Information System (DSIS)
    - Road and Weather Information System (RWIS)
    - Oregon database will be updated to include:
        - Data and time of last inspection
        - Carrier compliance
        - Safety status

    Phase II
    - Integrated Tactical Enforcement Network (ITEN)
    - Hardware and software upgrades
    - Additional safety enhancements
    - Additional information systems

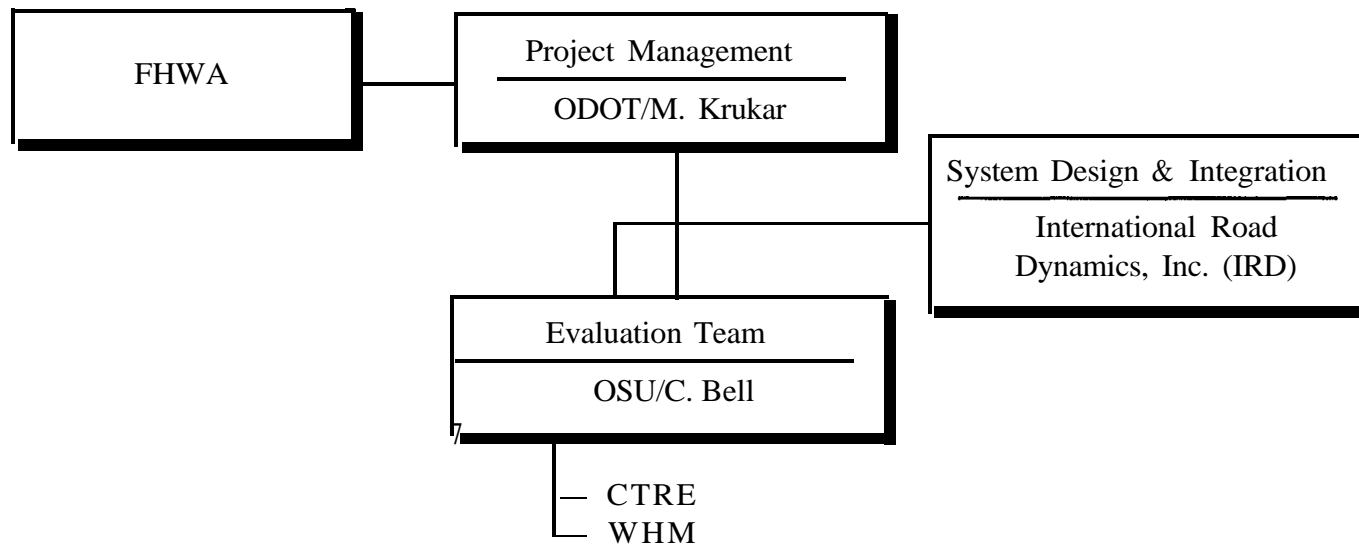- Phase III
    Add the by-pass routes and county/city roads

THE SYSTEMS AND SERVICES INCLUDE:

SYSTEMS

Mainline Preclearance Systems
   – Weight-in-Motion (WIM)
   –   Automatic Vehicle Classification (AVC)
   – Overheight Detectors
   –   Axle Sensors/Loop Detectors
   –   Automatic Vehicle Identification (AVI)
   –   Variable Message Signs (VMS)
   – Vision Technology
   –   Supervisory System Computer (SSC)
• Downhill Speed Information System (DSIS)
• Roadway Weather Information System (RWIS)
• Integrate Tactical Enforcement Network (ITEN)

SERVICES
• Weigh station and port-of-entry bypass · Automated weight, speed, and vehicle classification determination · Calculation and display of save downhill truck speeds · Identification of visibility, wind, and ice problems allowing maintenance staff to more effectively mitigate snow and ice conditions • Automated enforcment avoidance detection and notification

THE PROJECT TEAM IS LED BY OREGON DOT-THE EVALUATION WILL BE MANAGED BY OREGON STATE UNIVERSITY

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┌─────────────┐     ┌──────────────────────┐
│             │     │  Project Management  │
│    FHWA     │─────│──────────────────────│
│             │     │    ODOT/M. Krukar    │
└─────────────┘     └──────────────────────┘
                              │        ┌──────────────────────────┐
                              │        │ System Design & Integration│
                              │        │──────────────────────────│
                              │        │    International Road     │
                              │        │    Dynamics, Inc. (IRD)   │
                              │        └──────────────────────────┘
                    ┌──────────────────────┐
                    │    Evaluation Team   │
                    │──────────────────────│
                    │      OSU/C. Bell     │
                    └──────────────────────┘
                              │
                              ├── CTRE
                              └── WHM
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THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Will deployment of advanced technologies in an integrated network to provide mainline preclearance be effective in improving the efficiency of commercial vehicle operations?

- Can safety be enhanced by providing additional information to commercial vehicle operators and maintenance staff?

- Will strategic statewide deployment of enforcement systems affect compliance rates?

EVALUATION GOALS AND OBJECTIVES:

GOALS	OBJECTIVES
Assess Safety	• Determine change in safety compliance • Determine change in truck behavior due to the road weather information • Determine change in truck behavior due to the downhill speed information system
Assess Productivity	• Determine changes in tax administration costs • Determine changes in tax evasion
Assess Institutional and Interoperational Issues	• Document issues as they arise, e.g., IOU, HELP

PLANNED EVALUATION ACTIVITIES INCLUDE:

EVALUATION ACTIVITIES	DESCRIPTION
	TBD

EVALUATION PLANNING IS CURRENTLY UNDERWAY

THE PROJECT SCHEDULE:

	1995								1996										
Project Task	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Preparation of Site Plans		▬																		
Woodburn Weight Station Retrofit		▬▬▬																		
Ashland Weight Station			▬▬▬▬																	
Farewell Bend POE				▬▬▬																
Olds Ferry Weight Station			▬▬																	
La Grande Weight Station			▬▬																	
Emigrant Hill Downhill System			▬ ▬																	
Kamath Falls NB Weight Station				▬▬▬																
Kamath Falls SB Weight Station				▬▬▬																
Bend NB Weight Station					▬▬															
Bend SB Weight Station					▬▬▬															
Lowell NB Weight Station						▬▬▬														
Lowell SB Weight Station						▬ ▬														
Rocky Point Weight Station														▬▬▬						
Cascade Lock POE Retrofit												▬▬								
Wyeth Weigh Station												▬▬								
Ashland Downhill System														▬▬▬						
Evaluation Period															▬▬▬▬▬▬					

THE PROJECT SCHEDULE (CONTINUED):

											1996								1997				
RWIS Time Schedule																								
Project Task	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Task 1 Evaluate present RWIS technology/develop specifications																							
Task 2 - Evaluate and select sites																							
Task 3 - Liaison with "Green Light" Technical Advisory Group (TAG)/ Independent Evaluation Team (IET)																							
Task 4 - Liaison with Oregon DOT																							
Task 5 - Oversight and Evaluation of the installation																							
Task 6 -Oversight and evaluation of the testing																							
Task 7 - Report																							

THE PROJECT SCHEDULE (CONTINUED):

Evaluation Schedule

TASK	1995					1996												1997			
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Mobilization	▬	▬																			
Comprehensive Evaluation Plan		▬	▬	▬	▬	▬	▬	▬													
Evaluate Green Ligh Elements						▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
Quarterly Reports		●			●			●			●			●			●			●	●
Final Report																					
a. Draft															▬	▬					
b. Final																		▬	▬	▬	▬

TRANZIT XPRESS

Test & Evaluation Strategy

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluatibn Overview
- Schedule

THE TRANZIT XPRESS PROJECT WILL DEMONSTRATE A VEHICLE FLEET MANAGEMENT AND DATA MONITORING SYSTEM USING MULTIPLE, ADVANCED TECHNOLOGIES TO IMPROVE HAZARDOUS MATERIAL TRANSPORTATION SAFETY AND INDUSTRY PRODUCTIVITY

- The Tranzit XPress System will apply automated emergency response information technologies to:
  - identify hazardous material (HM) contents of motor carrier shipments
  - Link systems that identify, store, and allow retrieval of data for emergency response to incidents involving HM transportation
  - Provide information, either directly or through links to other systems, to facilitate the appropriate response to incidents involving motor carrier HM shipments (crisis management)

- The Tranzit XPress System will:
  - Gather and sell information on hazardous materials being transported
  - Provide one-time data entry for electronic bills of ladding and manifests
  - Provide vehicle and cargo location, status, and theft resolution
  - Support fleet management functions (e.g., trend analysis, route planning and monitoring, fuel tax reconciliation, maintenance action stimulation)

- Potential benefits of the system include:
  - Improved response to HM incidents by providing proactive notice to first responders
  - Reduced costs to shippers, carriers, and recipients through reduced paperwork, data entry, fines, insurance, lost time, and incident cleanup

- The project will be implemented in a 12 month phased task approach to achieve early and incremental successes

- The project will be conducted in northeastern Pennsylvania along and around the I-81 corridor between Binghamton, NY and Harrisbug, PA

THE '"OPERATIONS CENTER" IS THE HUB OF TRANZIT XPRESS' SERVICE

0 Clients dial up
via Internet or modem
to schedule shipment,
obtain status

LEO/GEOSAT

5 Vehicle/tags may get position
from Global Positioning
Satellite System

GPS
Sat

Clients

* Operations Center
archives info and
forwards details to
vehicle and containers

8 Directly interrogate
vehicle/containers

6
Tags report status as
planned or by exception
through vehicle
transponaerS

Shipper

Operations Center

Carrier

NIER

First Responders

Carriers

Recipient

Roadside
Interrogator

Existing Cellular
Network

7 Information received from tags is
packaged and forwarded per client
Specification

3 Data transferred by
existing terrestrial "î"
satellite links

4 Data relayed by
vehicle to
container tags

THE TRANZIT XPRESS SYSTEM ARCHITECTURE INCORPORATES MULTIPLE ADVANCED TECHNOLOGIES
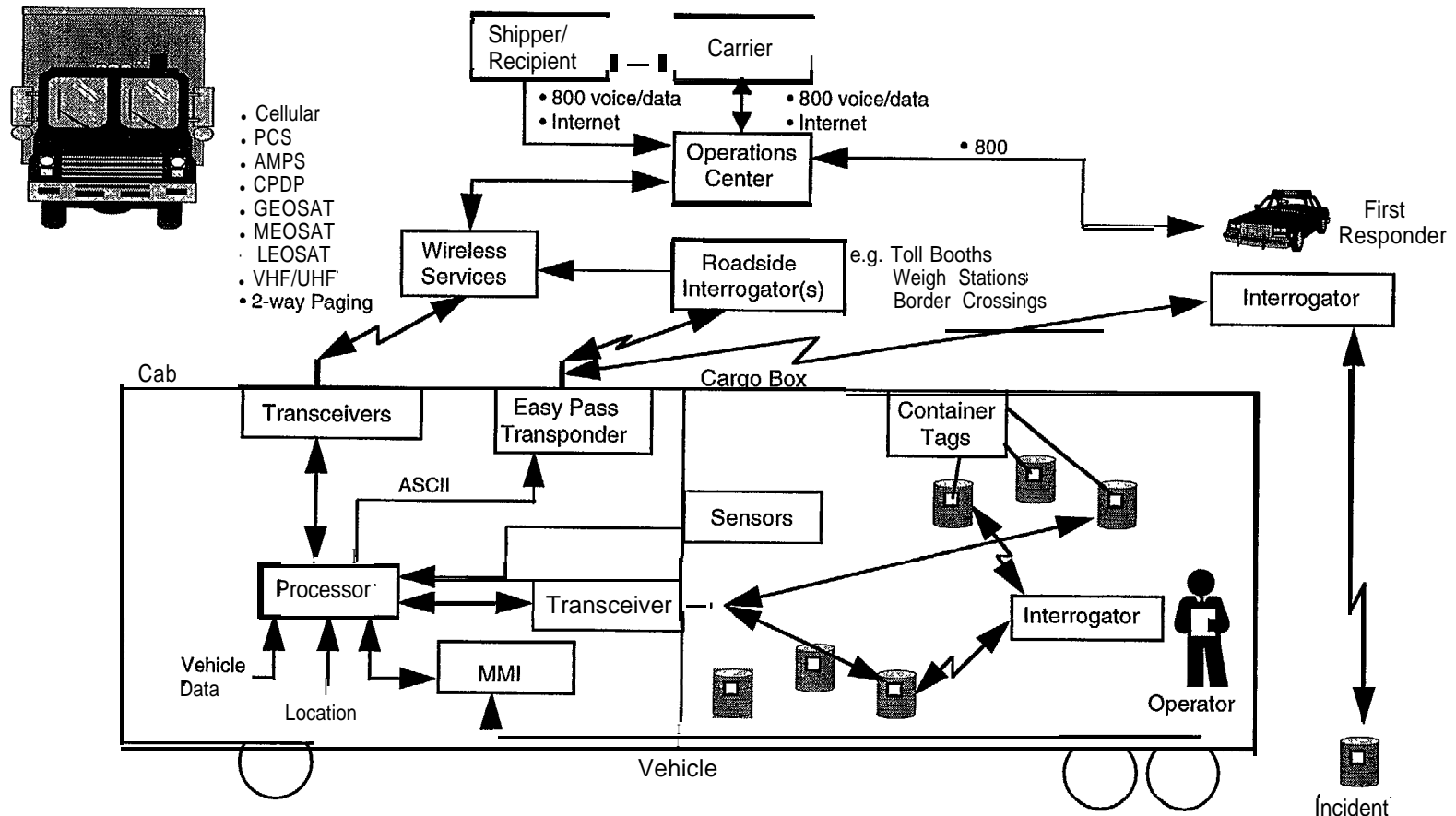
TRANZIT EXPRESS WILL EMPLOY INTEGRATED SYSTEMS TO PROVIDE COMMERCIAL VEHICLE FLEET MANAGEMENT, CARGO MANAGEMENT, AND HAZARDOUS MATERIAL SAFETY SERVICES

SYSTEMS
. Electronic Data Interchanges (EDI)
. Vehicle-Roadside Communications (VRC)
. Vehicle Transponders
. Global Positioning Satellite System (GPS)
ã Cellular and Satellite Communications
0 Cargo Tags
. Roadside Interrogators

SERVICES

. CVO Fleet Management
- · Dispatching
- · Theft Recovery Assistance
- · Operator Panic
- · Vehicle Operation Data
- Vehicle Location
- Route Planning
- Operator Voice Communications
- Cargo Container Paramaters

. CVO Cargo (HazMat) Management
- · Cargo Type and Quantity
- · Cargo Location in Vehicle
- · Electronic Manifests
- Cargo Safety
- Electronic Bills of Ladding

. Incident First Responder Enhancement
- · Quicker Response/Control
- · Reduced Public Impact
- Alternative Source of Information
- Better Information for Mixed Loads

. Provide Data to ITS and Enable ITS Services for CVOs
- · AVI, AVL, AVC
- · ATMS for Traffic Mgt. Bundle
- · CVO Bundle
- Emergency Management Bundle
- Electronic Payment Bundle

THE TRANZIT XPRESS PROJECT WILL BE DEPLOYED IN TWO PHASES WITH THE EVALUATION RUNNING CONCURRENTLY

- Phase I-Concept Definition and Rapid Prototyping **(6** months)
    - Obtain and integrate ITS lessons learned
    - System design and software development for the operations center
        - System engineering and test design
        - Database design, development, and population
        - Augment the NIER integrated environmental monitoring and data management system
    - Design, fabricate, test, and install vehicle tags
    - Design, fabricate, test, and install cargo tags
    - Develop and integrate response protocols and interrogators
- Phase II-Conduct Total System Test, Evaluate, and Evolve the System (6 months)
    - Static testing
    - Non-emergency dynamic testing
    - Simulated emergency testing
    - Reporting
    - Video tape production
    - Operational test self evaluation
- Evaluation

THE PROJECT TEAM IS LED BY THE NATIONAL INSTITUTE FOR ENVIRONMENTAL RENEWAL (NIER)-THE EVALUATION WILL BE MANAGED BY BOOZ-ALLEN & HAMILTON
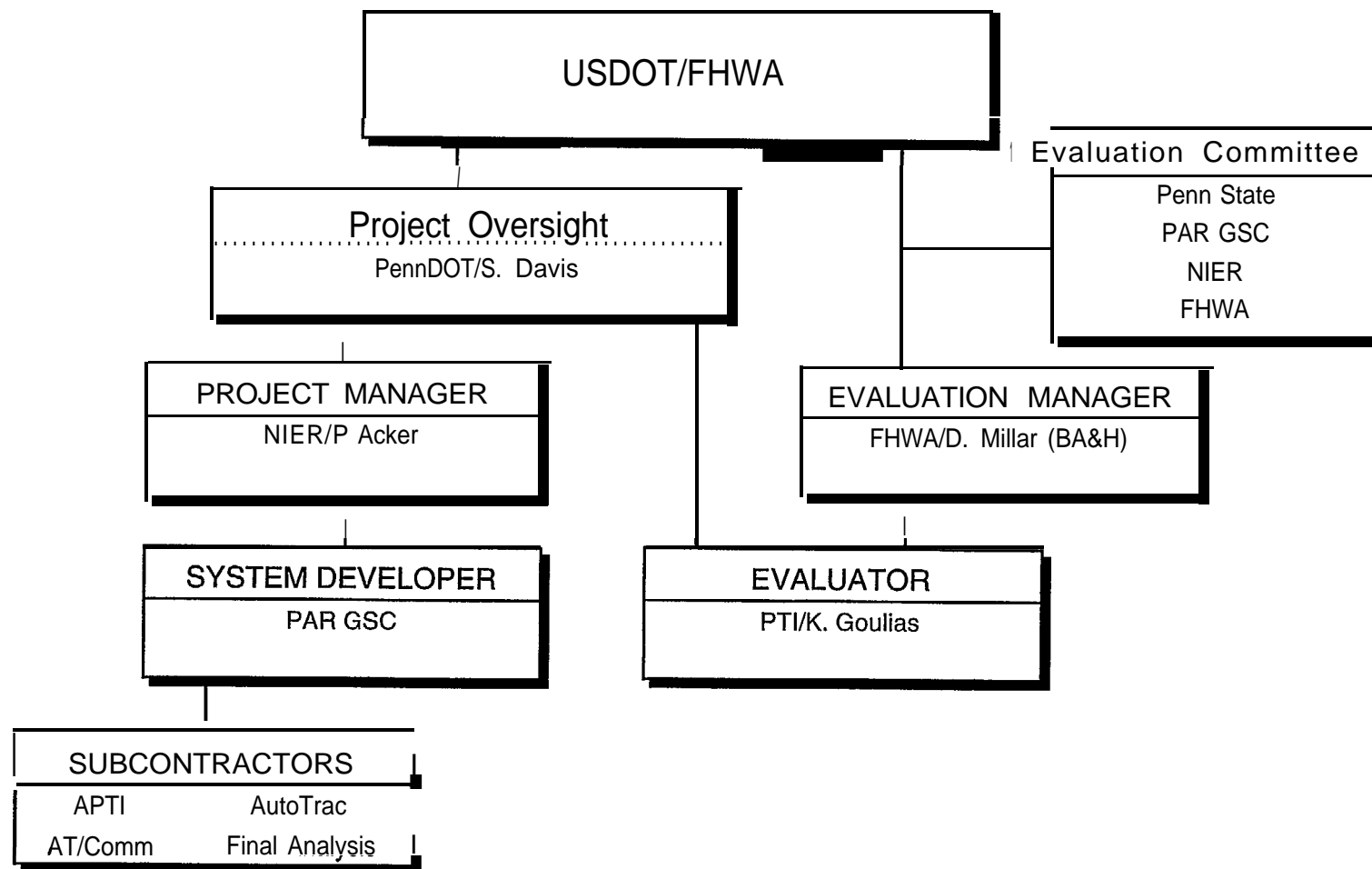
THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can a hazardous material information system significantly enhance hazardous material transportation safety?

- Can advanced technologies be used to identify hazardous material shipment contents?

- Can the use of advanced technologies enhance data retrieval for emergency response to HazMat incidents?

EVALUATION GOALS AND OBJECTIVES:

GOALS	OBJECTIVES
Assess Tranzit XPress'ability to improve HazMat transportation safety	· Assess the system's ability to decrease HazMat incident response time · Assess the system's ability to improve the accuracy of incident location identification · Assess the system's ability to improve the accuracy of HazMat cargo identification · Assess the system's ability to improve HazMat incident emergency response selection · Assess the system's ability to improve Motor Carrier and Shipper compliance with HazMat regulations
Evaluate user acceptance and perceptions (as they relate to the use of Tranzit XPress)	· Assess the Tranzit XPress' ability to meet the stated needs of specific user groups · Assess, for each group, perceptions of Tranzit XPress and its components · Assess, for each group, stated intention to use Tranzit XPress · Assess, for each group, stated intention to use individual components of Tranzit XPress · Assess, for each group, stated intention to use information generated and/or routed through Tranzit XPress
Assess expected costs and benefits of Tranzit XPress to users and community	· Assess the potential decrease in agency costs for HazMat routing,licensing, monitoring, record keeping, liability, and enforcement operations · Assess the potential decrease in incident-related operating and capital costs for motor-carriers and responding agencies · Assess the potential decrease in direct and indirect incident/accident related injuries and/or deaths of plants, animals, and humans · Assess the potential decrease in population risk, exposure and related costs · Assess the benefits for and complementary functions to other ITS components emerging from Tranzit XPress · Assess the component and system level short term and long term costs
Assess the technical feasibility of Transit XPress system	· Assess the ability of Tranzit XPress to identify the contents of HazMat shipments transported by motor carriers · Assess the ability of Tranzit XPress to link systems that identify, store and allow retrieval of data for emergency response to incidents and accidents · Assess the ability of Tranzit XPress to provide information to facilitate responses to accidents and incidents either directly or through links with other systems
Document and assess the effect of institutional and legal issues on the Tranzit XPress operational test and future deployment	· Identify all institutional and legal issues encountered and appraise the extent of their impact for future deployment · Document any institutional and legal lessons learned · Assess state agency, federal agency, first responder, and enforcer positions on deployment of Tranzit XPress · Assess shipper, carrier, and recipient positions on deployment of Tranzit XPress · Collect and maintain a library of contracts, agreements, working papers, and reports from key participants describing the impact of institutional and legal issues on project development

Schedule.. ,

THE PROJECT SCHEDULE:

TASK	1995				1996									
	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Phase 1: Rapid Prototyping														
A. Kick Off Meeting	*													
B. Obtain Lessons Learned														
C. System Design, Develop Software for Fusion Ctr														
D. Design, Fab., Test & Install Vehicle Tags														
E. Design, Fabricate, Test Cargo Tags														
F. Develop & Integrate Response Protocols & Interrogators														
Phase 2: Test, Evaluate & Evolve														
G. Conduct total system Test, Evaluate and Evolve														
G1. Static Testing														
G2. Non-Emergency Dynamic Testing					TBD									
G3. Simulated Emergency Testing														
G4. Reporting														
G5. Video Tape Production														
H. Configuration Management														
Evaluation														
Evaluation Strategy														
Evaluation Plan														
Individual Test Plan														
Evaluate														
Report														
Monthly Progress Reviews	*	*	*	*	*	*	*	*	*	*	*			
Quarterly Reviews				*			*			*				

Volume I-Commercial Vehicle Operational Tests

PROGRAM COMPLETION PLANS

U.S. Department of Transportation
Federal Highway Administration

ADVANTAGE I-75
MAINLINE AUTOMATED CLEARANCE
SYSTEM (MACS) OPERATIONAL TEST

Project Completion Plan

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

ADVANTAGE I-75 MACS PROJECT WILL APPLY AUTOMATIC VEHICLE IDENTIFICATION TECHNOLOGIES TO ENABLE COMMERCIAL VEHICLES TO BY-PASS WEIGH STATIONS ALONG THE I-75 CORRIDOR

- Approximately 4,500 trucks equipped with transponders to communicate with roadside readers at weigh stations, which will identify the truck

- 30 weigh stations with roadside readers along the I-75 corridor in the U.S. and Canada will identify participating trucks, checking weight, and credentials

- When MACS determines the truck weight and credentials to be valid, a pre-clearance signal is sent to the truck transponder

- The truck driver sees a green light, and hears an audible signal that notifies him or her that they are cleared to by-pass the station.

- Significant future participation will allow law enforcement to by-pass compliant and safe vehicles, allowing them to concentrate on marginal or unsatisfactory operators.

ADVANTAGE I-75 MACS IS A PUBLIC/PRIVATE PARTNERSHIP INVOLVING SIX U.S. STATES, A CANADIAN PROVINCE AND MAJOR SYSTEM DEVELOPERS
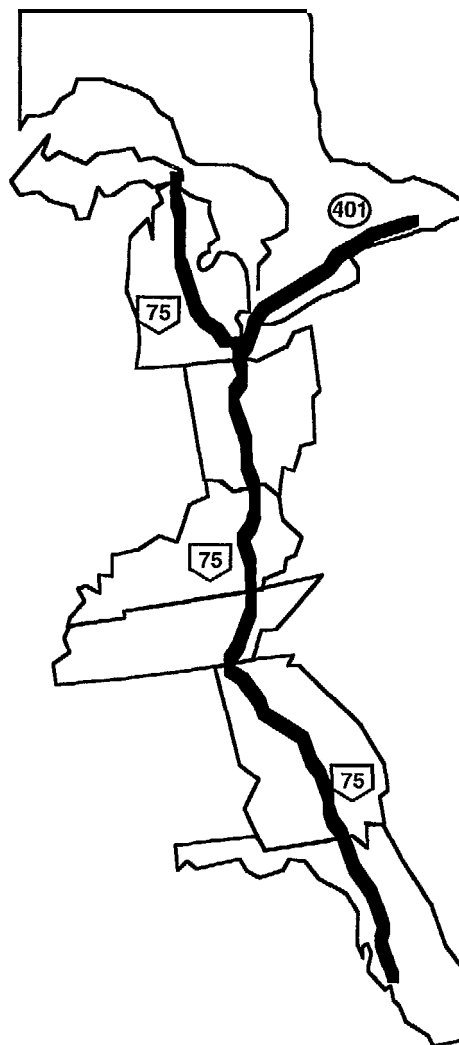
Public Partners

- State of Florida
- State of Georgia
- State of Tennessee
- State of Kentucky
- State of Ohio
- State of Michigan
- Province of Ontario
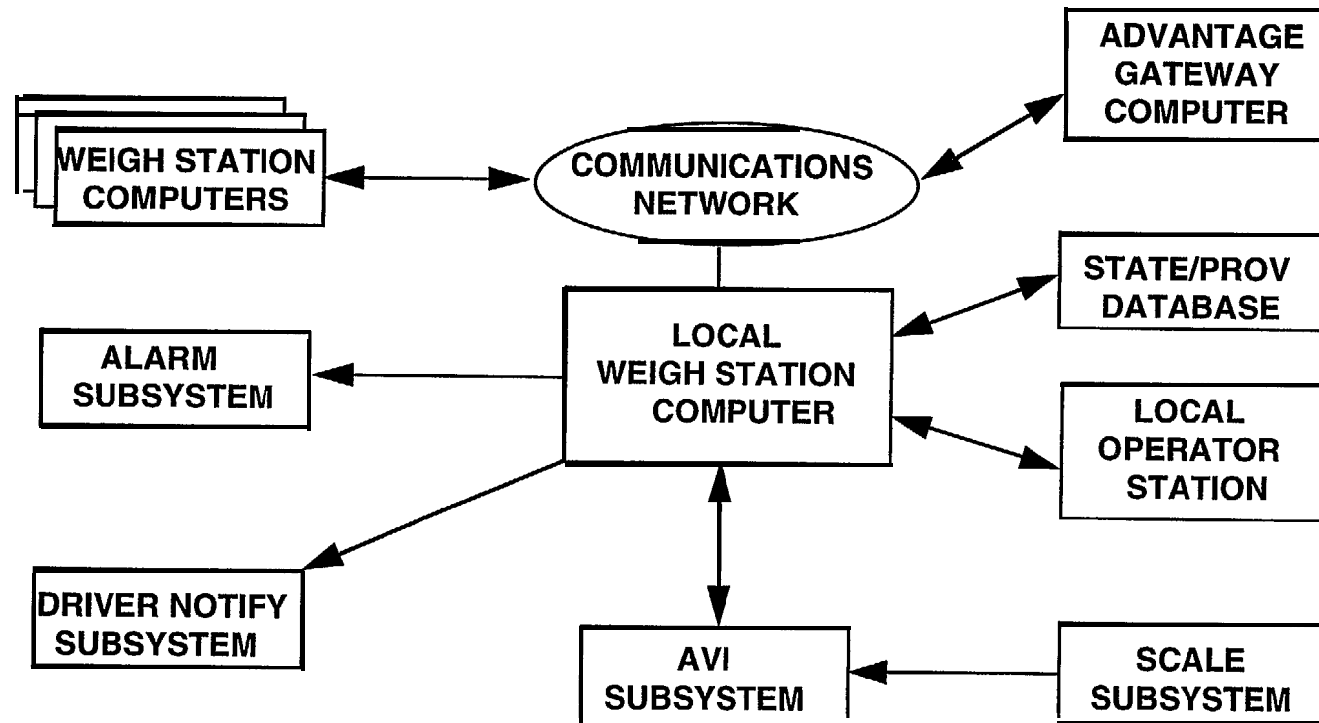- FHWA

Private Partners

- GM-Hughes Electronics
- SAIC

Other Participants

-Center for Transportation
  Research & Education CTRE)
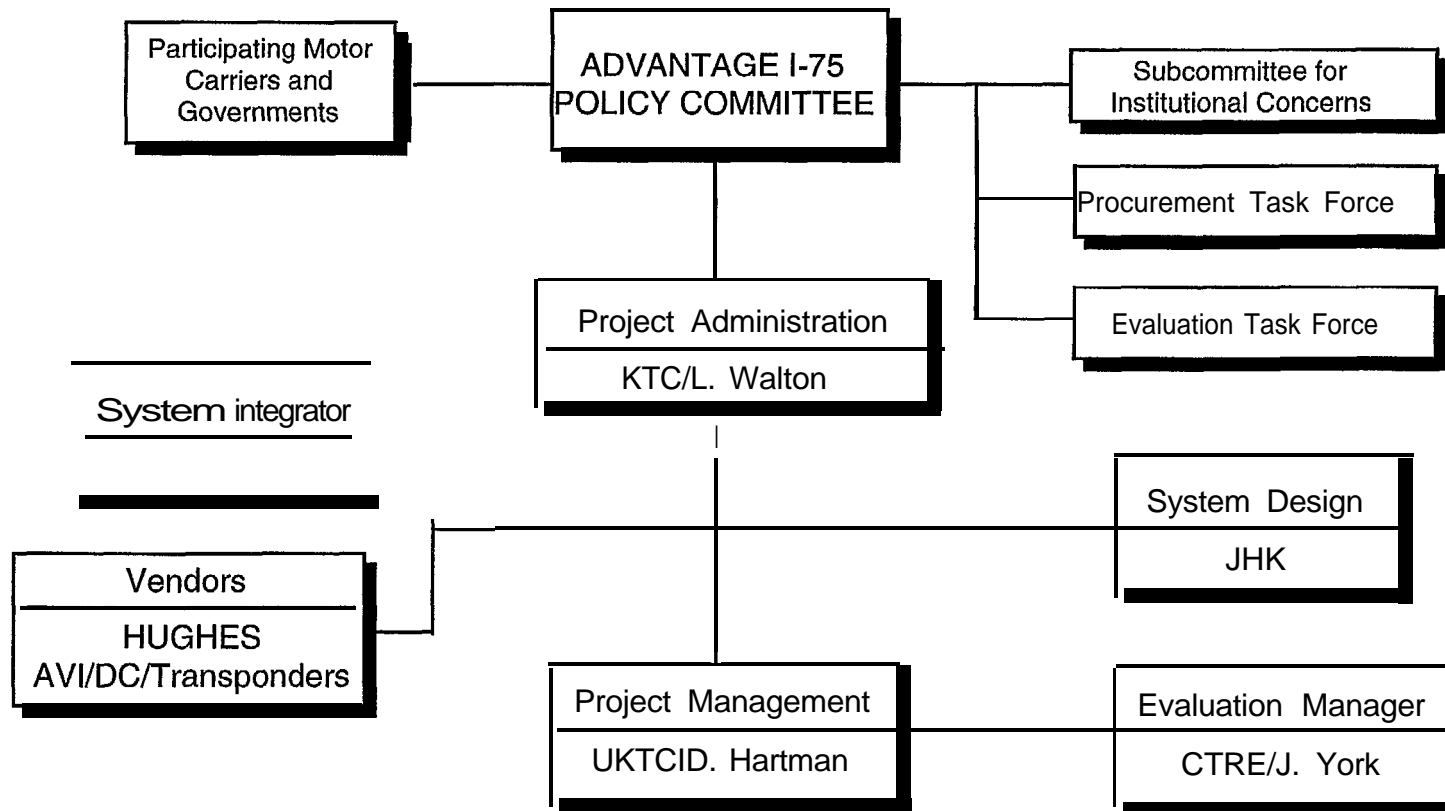
THE ELEMENTS OF THE MACS ARCHITECTURE ARE:

MACS INCLUDES THE FOLLOWING SYSTEMS AND SERVICES FOR THE TEST

SYSTEMS	SERVICES
• ADVANTAGE Gateway Computer	• Data Management - enrolls carriers, maintains the ADVANTAGE data base and maintains statistics
· Weigh Station Computer	• Station-level data processing - preclearance determination, scale/Automated Vehicle Identification (AVI) interface, data management, reporting and operator interface
• Driver Notification	• Advises individual truck drivers when preclearance is authorized via on-board lights (red/green)
*Scale and Vehicle Classification	• Automated Classification - captures axle spacing, widths and gross vehicle weight as well as classifying the unit into standard categories
· Weigh Station Interfaces	• System Integration - Links ADVANTAGE l-75 MACS system to station sign control, traffic control, enforcement personnel operator terminals, violation larms, etc.
• Compliance Verification Routine	• Enforcement - Monitors and enforces compliance with directives given to truck drivers
• Data Communications	• Enables data communication

THE PROJECT TEAM IS LED BY THE UNIVERSITY OF KENTUCKY TRANSPORTATION CENTER (UKTC)-THE EVALUATION WILL BE MANAGED BY THE CENTER FOR TRANSPORTATION RESEARCH AND EDUCATION

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┌──────────────────┐        ┌──────────────────┐        ┌──────────────────┐
│ Participating    │        │  ADVANTAGE I-75  │        │  Subcommittee for│
│ Motor Carriers   │────────│ POLICY COMMITTEE │────────│   Institutional  │
│ and Governments  │        │                  │        │     Concerns     │
└──────────────────┘        └──────────────────┘        └──────────────────┘
                                     │          │
                                     │          │        ┌──────────────────┐
                                     │          └────────│ Procurement Task │
                                     │                   │      Force       │
                                     │                   └──────────────────┘
                            ┌──────────────────┐
                            │ Project          │        ┌──────────────────┐
                            │ Administration   │────────│ Evaluation Task  │
                            │ KTC/L. Walton    │        │      Force       │
                            └──────────────────┘        └──────────────────┘
   System integrator                │
                                     │                  ┌──────────────────┐
                                     │                  │  System Design   │
                            ┌────────┴─────────┐        │       JHK        │
   ┌──────────────────┐     │                  │        └──────────────────┘
   │     Vendors      │─────┘                  │
   │     HUGHES       │                        │
   │ AVI/DC/Transponders│                      │
   └──────────────────┘     ┌──────────────────┐       ┌──────────────────┐
                            │ Project          │       │ Evaluation       │
                            │ Management       │───────│ Manager          │
                            │ UKTCID. Hartman  │       │ CTRE/J. York     │
                            └──────────────────┘       └──────────────────┘
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THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Does mainline clearance produce significant time savings for motor carriers?

- Does mainline clearance produce significant fuel savings for motor carriers?

- What level of electronic clearance participation is required to reduce unauthorized scale by-passes on I-75?

- What level of electronic clearance participation is required to significantly reduce queue lengths at weigh stations along the I-75 corridor?

- What are the barriers that impede continued deployment by states of electronic clearance after completion of the MACS test?

- What are the barriers that impede continued participation in electronic clearance after completion of the MACS test?

THE EVALUATION WILL ASSESS SERVICE AND SYSTEM PERFORMANCE ASPECTS OF THE MACS

GOALS	OBJECTIVES
Evaluate Service Impacts of the MACS	• Assess effects on motor carrier performance - energy savings . Assess effects on motor carrier performance - travel time savings • Assess effects on motor carrier performance - trip time savings . Assess effects on motor carrier performance - improved productivity • Assess effects on weigh station performance - throughput processing times 0 Assess effects on weigh station performance - increased citations . Assess effects on weigh station performance - reduced closed times • Assess effects on weigh station performance - reduced congestion • Assess effects on weigh station performance - reduced merges • Assess effects on weigh station performance - reduced queues • Assess effects on weigh station performance - improved air quality • Assess effects on weigh station performance - increased credential monitoring • Assess effects on motor carrier safety - MACS participant carriers • Assess effects on motor carrier safety - general motor carrier participation • Assess effects on credential compliance . Assess effects on jurisdictional issues
Evaluate System Performance Impacts of the MACS	• Correct processing of vehicles • Accurate information relay to transponder • Read/write accuracy • User friendly operator interface • User friendly interface . Manage credential update and enrollment process

PLANNED EVALUATION ACTIVITIES INCLUDE:

ACTIVITY	DESCRIPTION
MACS TECHNICAL EVALUATION	A technical performance evaluation by UKTC that focuses on the equipment being set up at weigh stations and the test operations center
FUEL CONSUMPTION TESTS	Society of Automotive Engineers (SAE) - approved tests at one weigh station in every state and province will be conducted with specially instrumented heavy trucks to demonstrate the expected amount of fuel savings attainable with electronic clearance
WEIGH-STATION THROUGHPUTTESTS	Traffic counts at one weigh station in every state will be conducted to support the weigh station modeling being developed to demonstrate the impacts of MACS market penetration on weigh station loading
INSTITUTIONAL ISSUES OF THE TEST	The Independent Evaluator will document the institutional issues that surfaced during the planning and conduct of the test. This is not to be confused with the institutional issues that pertain to deelovment.

BENEFITS REALIZED TO DATE INCLUDE:

- Already, southeastern states from Virginia to Mississippi, are showing keen interest in adopting MACS

- Early Modeling efforts from pilot test data show some significant beneficial impacts of MACS on weigh stations that suffer from over-capacity problems and have to by-pass trucks.

- SAE approved fuel consumption tests have consistently shown measurable and, over the long term, significant fuel savings as a result of by-passing weigh stations.

THE PROJECT SCHEDULE:

TASK	1995 J F M A M J J A S O N D	1996 J F M A M J J A S O N D	1997 J F M A M J J A S O N D
Hypothesis Validation	▬		
Pilot Study Design	▬		
Pilot Study Execution	▬		
Evaluation Recommendations	▬		
MACS Technical Data Collection		▬▬▬▬▬	
MACS Mainline Data Collection		▬▬▬▬▬	
Technical Evaluation Report			▬▬
Independent Evaluatron Final Report			▬▬

U.S. Department of Transportation

Federal Highway Administration

AUTOMATED MILEAGE AND STATELINE CROSSING OPERATIONAL TEST (AMASCOT)

Project Completion Plan

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

AMASCOT IS A COMMERCIAL VEHICLE OPERATION (CVO) PROJECT THAT IS TESTING A SYSTEM THAT TRACKS TRUCK MILEAGE AND STATE BORDER CROSSINGS FOR FASTER AND EASIER REPORTING TO STATE REGULATORY AGENCIES

- On-board GPS system automatically tracks and updates truck position

- GPS location data is translated into map database (PC Miler)

- Interstate border crossings are recorded to automatically apportion actual mileage to actual state driven

- At the end of a trip, the data is brought to the carrier operations office for immediate processing into IFTA/IRP formats

**SIX MOTOR CARRIERS FROM THREE STATES ARE PARTICIPATING TRUCKS
FROM THOSE CARRIERS DRIVE ON TAXABLE ROADS OVER THE 48
CONTIGUOUS STATES**

Public Partners

- Minnesota DOTMinnesota DOT
- Iowa DOTIowa DOT
- Minnesota DOT
- Federal Highway Administration (FHWA)

Private Partners

- Rockwell Intl
- Rand McNally
- ATAF
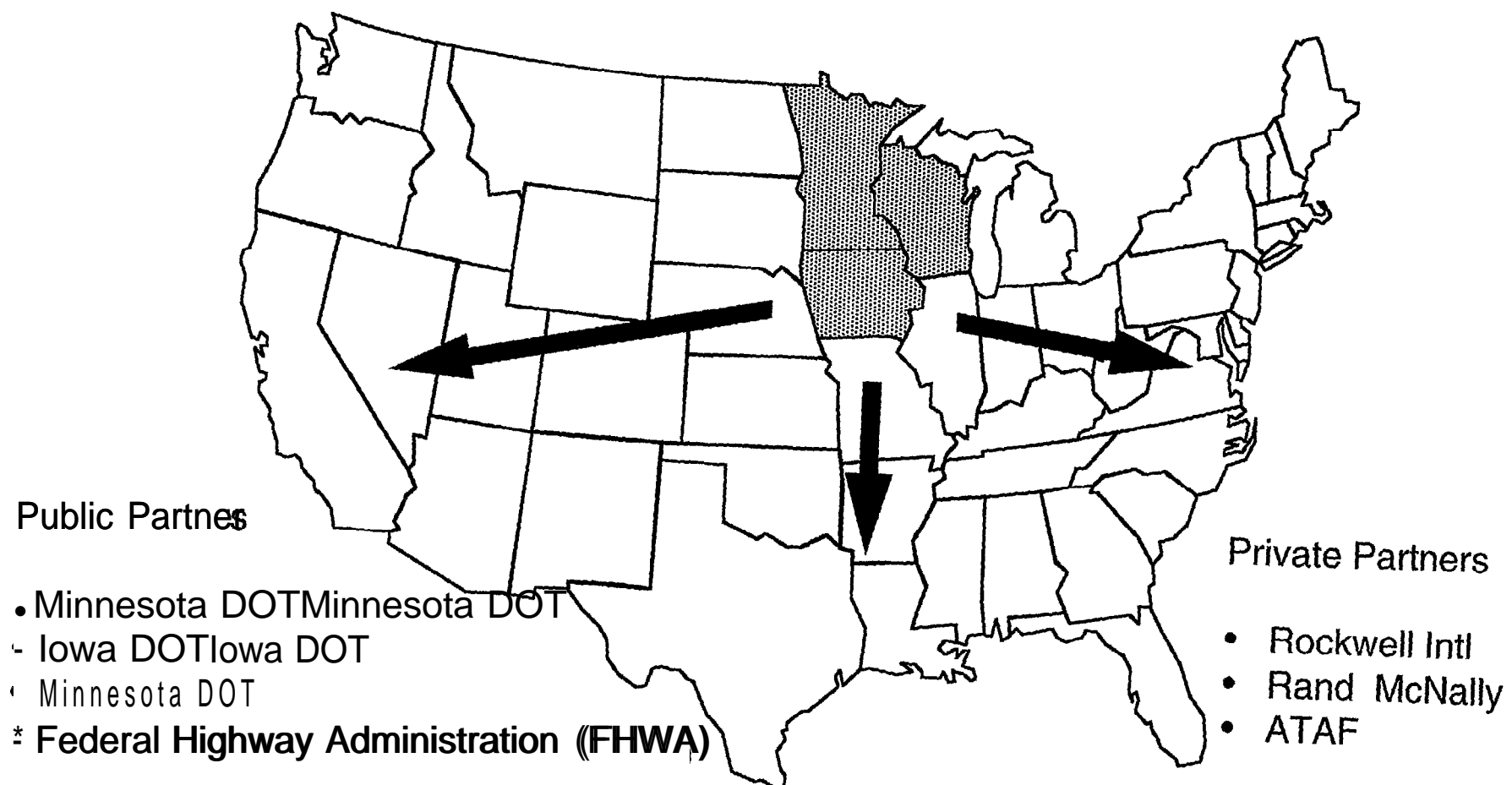
THE ON-BOARD SUBSYSTEM TRANSMITS MILEAGE AND LOCATION DATA TO THE FIXED SUBSYSTEM

Antenna

Mobile On-Board Subsystem

Fixed Subsystem

Stateline Database	Global Positioning System
Stateline Crossing Algorithm	Central Processing Unit
Mileage Recording	

Rockwell Cedar Rapids

Data Processing

Motor Carrier Simulation

Digital Distance Input

Manual Keyboard Input

State Auditors (IA, MN, WI)

Evaluation
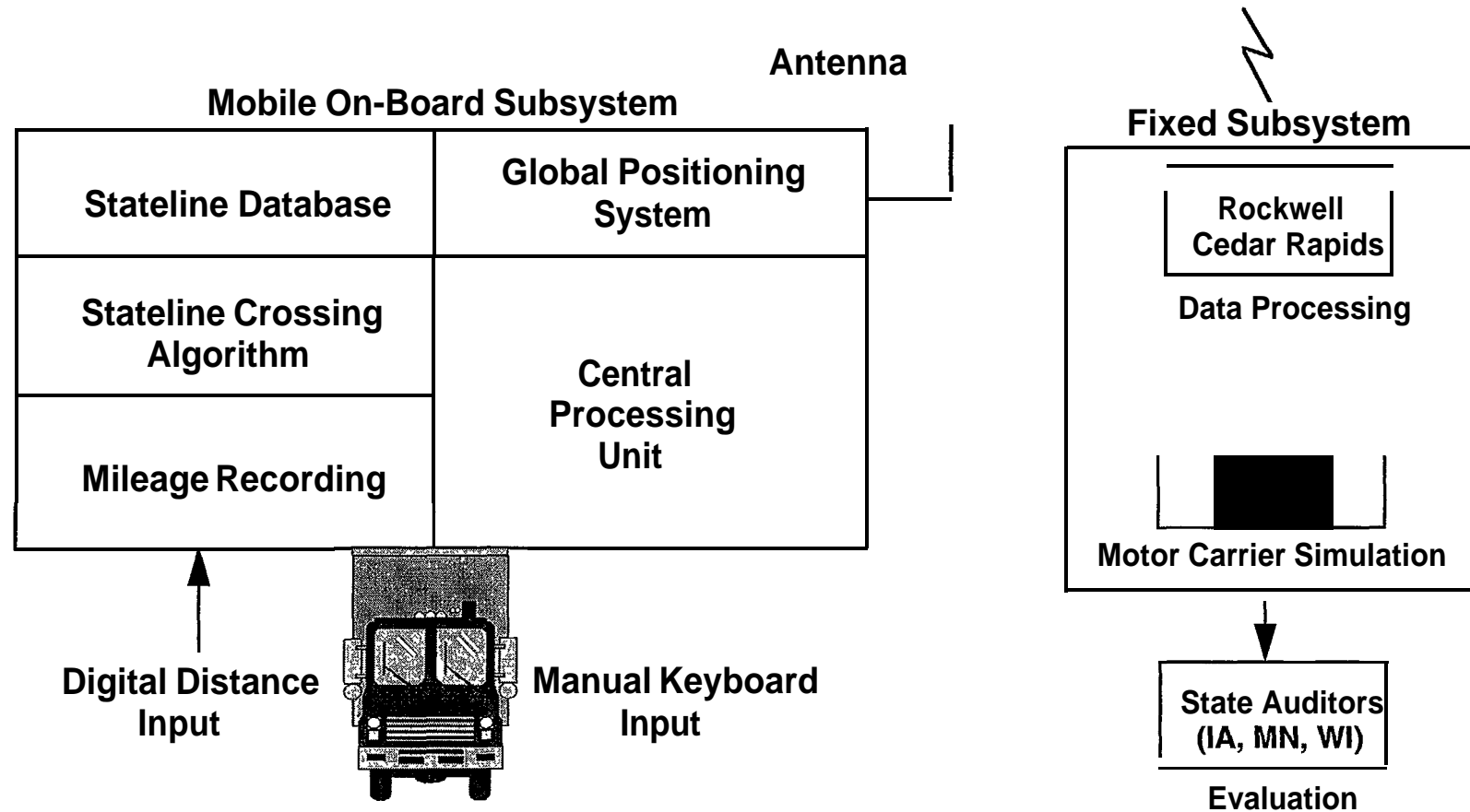
CTRE simulates the carrier role in submitting reports to participating auditors

A VARIETY OF TECHNOLOGIES WERE APPLIED TO SUPPORT VEHICLE TAX CALCULATION PROCESSES

SYSTEMS
- Mobile Subsystem
– Mileage Recorder
– Global Positioning System (Automated Vehicle Location)
– Stateline Database
– Stateline Crossing Algorithm

SERVICES
• Mileage tracking and distance calculation
· Vehicle location tracking
· Automated truck trip log entry and repotting

THE PROJECT TEAM IS LED BY THE CENTER FOR TRANSPORTATION RESEARCH AND EDUCATION-THE EVALUATION IS MANAGED BY THE THREE PARTICIPATING STATE DOT AUDITORS
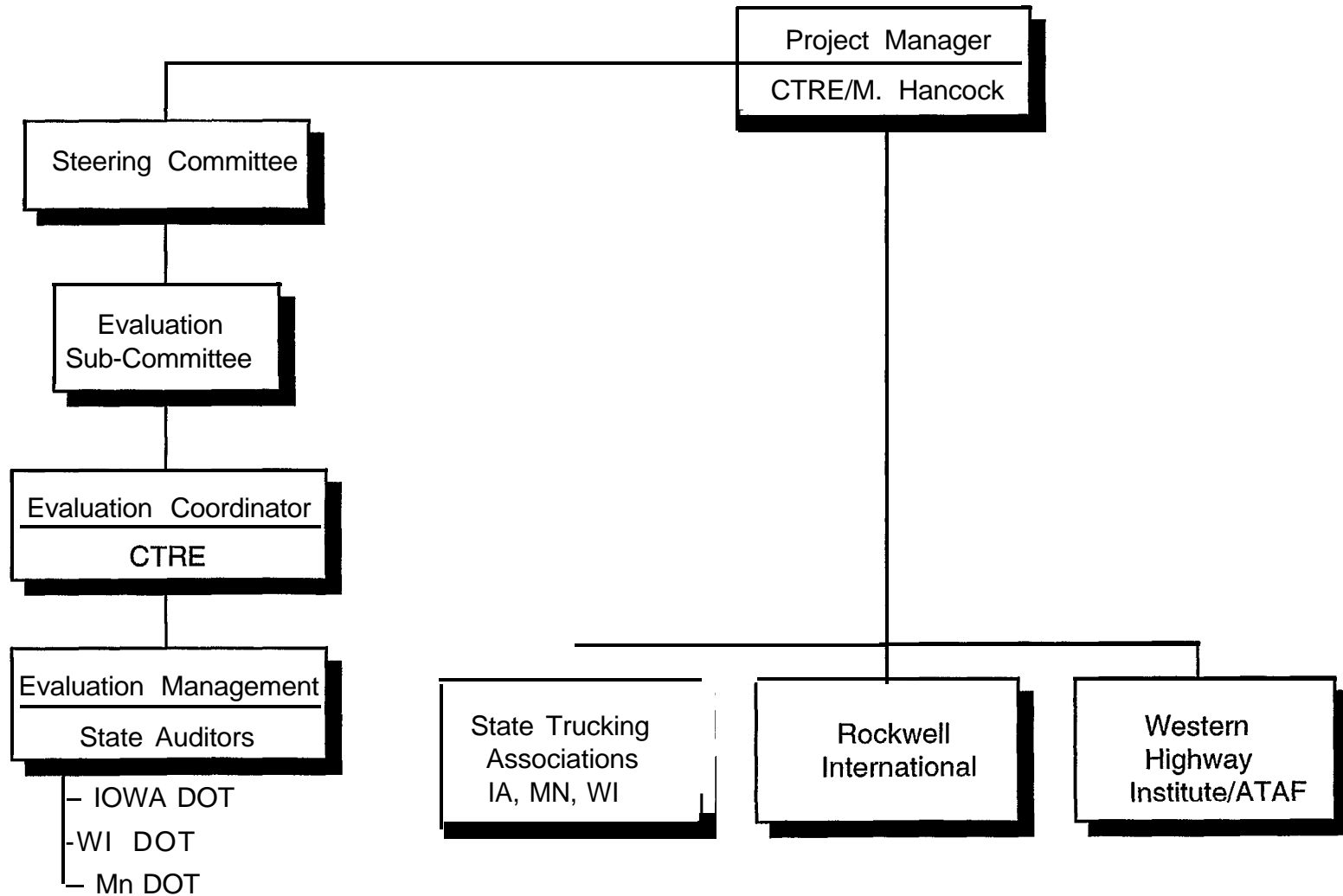
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                                         ┌─────────────────────┐
                                         │  Project  Manager   │
                                         ├─────────────────────┤
                                         │  CTRE/M.  Hancock   │
                                         └─────────────────────┘
        ┌─────────────────────┐                     │
        │  Steering  Committee │                     │
        └─────────────────────┘                     │
                  │                                  │
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        │    Evaluation       │                     │
        │   Sub-Committee     │                     │
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        │ Evaluation Coordinator│                   │
        ├─────────────────────┤                     │
        │        CTRE         │                     │
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        │ Evaluation Management│     │                                 │
        ├─────────────────────┤     │                                 │
        │   State Auditors    │     │                                 │
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          – IOWA DOT      ┌──────────────┐  ┌──────────────┐  ┌──────────────┐
          -WI  DOT        │ State Trucking│  │   Rockwell   │  │   Western    │
          – Mn DOT        │ Associations  │  │International  │  │   Highway    │
                          │  IA, MN, WI   │  │              │  │Institute/ATAF│
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THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can automation of fuel tax reporting satisfy IFTA/IRP reporting requirements?
- Can automation enhance the ability of state regulatory agencies to audit motor carrier records?
- Will automated fuel tax reporting provide time and cost savings to motor carrier operators?

THE AMASCOT EVALUATION IS BEING PERFORMED BY THREE STATE AGENCY AUDITORS-THE EVALUATION GOALS ARE:

- Evaluate the potential of the technology used in AMASCOT to support the automation of fuel use and apportioned mileage reporting in support of the International Fuel Tax Agreement (IFTA) and individual states

- Evaluate the potential of the technology used in AMASCOT to support the development of state auditing guidelines and electronic submittal to base state jurisdictions

- Evaluate the potential of the technology used in AMASCOT in terms of user acceptance, costs and benefits for motor carriers, states and IFTA

PLANNED EVALUATION ACTIVITIES INCLUDE:

EVALUATION ACTIVITY	DESCRIPTION
Motor Carrier Test	90 days of participation by motor carriers. Trucks drove normal routes and transmitted data to Iowa CTRE for processing and submission to state auditors.
Auditor Review	State auditors review processed data in accordance with normal procedures and determine if state reporting requirements are met.

BENEFITS REALIZED TO DATE INCLUDE:

- Performance of the system meets the IFTA/IRP reporting requirements

- The system is being introduced as a commercial product for motor carrier operators

THE PROJECT SCHEDULE:

	1994 J F M A M J J A S O N D	1995 J F M A M J J A S O N D	1996 J F M A M J J A S O N D
Pilot Demonstration (Phase 1)	▪		
Truck Installation			
Truck Trials (Phase 2)		▬▬▬	
Data Analysis		▬▬▬	
Final Report		▬▬	

U.S. Department of Transportation
Federal Highway Administration

COMMERCIAL VEHICLE OPERATIONS ONE-STOP ELECTRONIC PURCHASING AND PROCESSING

(HELP One-Stop)

Project Completion Plan

ITS Operational Test Program   **February 5,1996**

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

HELP ONE-STOP IS ONE OF THE THREE OPERATIONAL TESTS EXAMINING THE USE OF AN ELECTRONIC CREDENTIAL APPLICATION AND ISSUANCE SYSTEM FOR COMMERCIAL MOTOR VEHICLES

- The HELP One-Stop system will provide remote terminal access to motor carriers for the filing anD, issuance of credentials/permits.

- Electronic credential/permitting issuance from any jurisdiction using a standard interface and software allows the carrier to print the following temporary credentials:
    - International Fuel Tax Agreement (IFTA)
    - International Registration Plan (IRP)
    - Overdimensional/0verweight (OD/OW)
    - Single State Registration System (SSRS)
    - Hazardous Materials (HAZMAT)
    - Weight Distance (WD)
    - Envelope permits

- Service Center Operations will provide a centralized, multi-jurisdictional operation to issue physical credentials initiated by the system. Twenty-four-hour/seven-day remote automated service will be provided and ancillary services (technical and operational) will be provided to meet anticipated industry needs.

- The project will provide for integration with existing public sector systems and databases and assistance with integration on the participating motor carriers side. The system deployed will use a common platform to provide a transparent interface to the user. The system will also provide for electronic funds transfer or other automated means for fee collection.

- The operational test is being conducted in Arizona, New Mexico, and California and involves 17 commercial vehicle participants including one permitting service vendor.

THE HELP ONE-STOP SYSTEM IS COMPRISED IS SEVEN INDIVIDUAL MODULES:
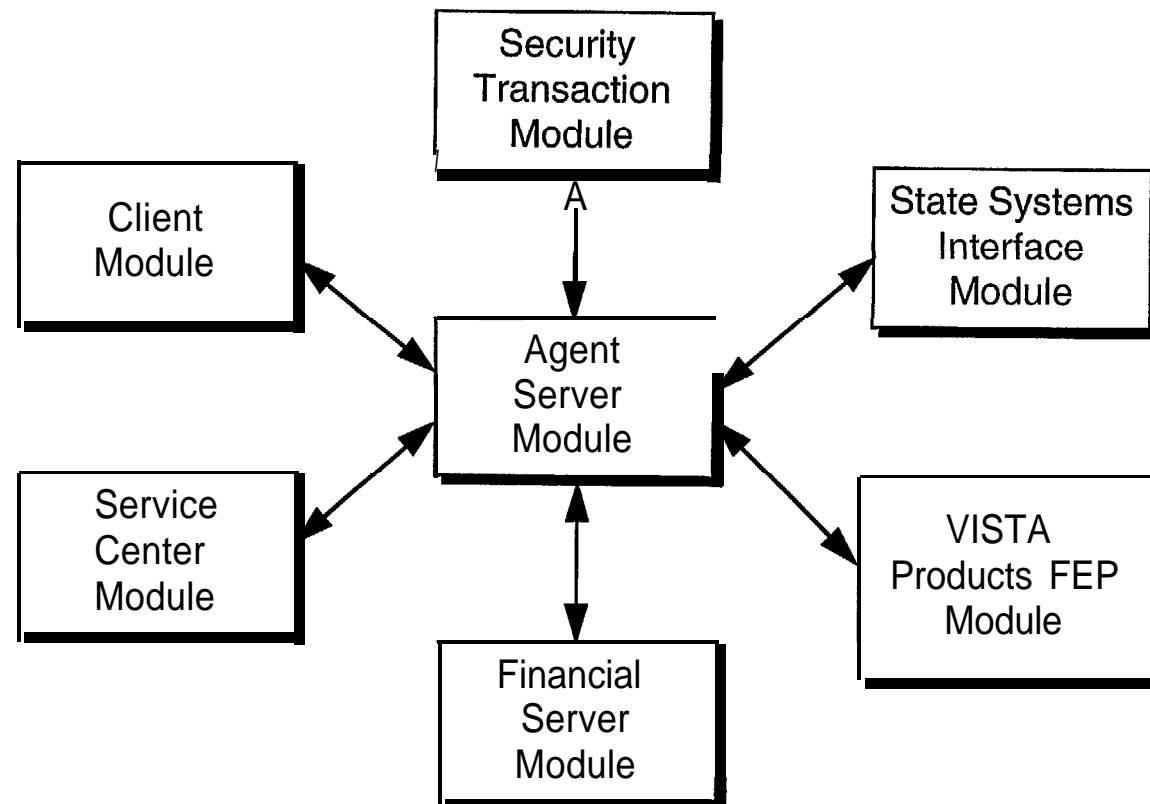
THE PROJECT TEAM IS LED BY HELP INC.-THE EVALUATION WILL BE MANAGED BY WHI

FHWA

			STEERING COMMITTEE
Evaluation Manager	**Project Management**		Functionality
WHI/J. Treber	Help Inc./P. Burns		Evaluation Criteria
			Tech Review
			Policy Advisor

AAMVA	STATES AZ, CA, NM	LOCKHEED	ATA NPTC/PFMI
National Coordination	User Interface	Customer Services Ops	Industry Interface
VISTA	State Database	Training	Coordination
	State PM	HELP Ops	Promotion
	Project Teams	VISTA Operations	Eval User Interface
		Software Integration	

THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

Can the implementation of a One-Stop shopping system for the management of the commercial vehicle credential process result in improvements in the convenience, timeliness, and consistency of applying for and receiving credentials?

Will motor carriers and state agencies accept electronic one-stop shopping services?

Can the institutional issues involved in the implementation and use of a paperless credentialing method be overcome?

EVALUATION GOALS AND OBJECTIVES:

Goal	Objective
Evaluate system effectiveness (for each component)	· Assess productivity impacts • Assess impacts on consistency and uniformity • Assess impacts on service quality
Evaluate the system operation	• Assess system performance • Assess system suitability
Determine physical conditions and requirements	• Document operational test conditions and requirements • Estimate deployment conditions and requirements
Evaluate user acceptance	• Assess motor carrier acceptance · Assess state agency acceptance
Document and assess institutional issues	• Assess motor carrier positions • Assess state agency positions • Maintain a library of all contracts and agreements

PLANNED EVALUATION ACTIVITIES INCLUDE:

Test	Purpose	Approach	Timing
1. System Records Selection	To collect quantitative operational data (e.g., number and length of transactions) automatically from the HELP electronic system	Automatic system capture	Every other month throughout the evaluation execution phase (four data packages)
2. System Operator and Phone Agent Logs	To collect basic activity measures (e.g., up and down time, number of callers) from HELP electronic system operators and Service Center phone agents	Logs	Weekly throughout the evaluation execution phase (32 data packages)
3. System Operator and Phone Agent Surveys	To collect more qualitative operational data (e.g., time spent wlth system, user feedback) plus attitudinal data (e.g, interface preferences) from HELP electronic system operators and Service Center phone agents	Surveys	In the first, middle, and last months of the evaluation execution phase (three data packages)
4. User Surveys	To collect more qualitative operational data (e.g., which services used) plus behavioral and attitudinal data (e.g. rating of services) from HELP users	Surveys	In the first, middle, and last months of the evaluation execution phase (three data packages), plus random on-line surveys
5. Personal Observations and Interviews	• Motor Carriers--to collect more qualitative operational data (e.g., cycle times, costs) from HELP users and to probe their responses to survey behavioral and attitudinal questions (e.g., Why to they agree/disagree?)	Personal observation and interviews	In the first and last months of the evaluation execution phase (two data packages)
	• State Agencies--to collect more qualitative operational data (e.g., cycle times, costs) from HELP users and to probe their responses to survey behavioral and attitudinal questions (e.g., Why to they agree/disagree?)	Personal observation and interviews	In the first and last months of the evaluation execution phase (two data packages)
	• System Operator and Phone Agents--to collect more qualitative operational data (e.g., costs, configuration requirements) from HELP electronic system operators and phone agents and to probe their responses to survey behavioral and attitudinal questions	Personal observation and interviews	In the first and last months of the evaluation execution phase (two data packages)
6. Simulation	To test the electronic system's operation (e.g., accuracy, speed) against predefined benchmarks	Electronic simulation	In the first and last months of the evaluation execution phase (two data packages)

THE PROJECT SCHEDULE:

	MONTHS	
TASK	**1995**	**1996**
1. Project Management		
2. Analysis		
3. Design		
4. Software Integration and Unit Test		
5. System Testing		
6. System Startup		
7. Policies, Procedures, and Training		
8. Test Ops and Maintenance		
9. Evaluation		

U.S. Department of Transportation
Federal Highway Administration

DYNAMIC DOWNHILL TRUCK SPEED WARNING SYSTEM

(DTSW)

Project Completion Plan

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

THE DTSW PROJECT SEEKS TO AFFECT COMMERCIAL VEHICLE DRIVER BEHAVIOR BY PROVIDING A SAFE DOWNHILL SPEED MESSAGE FOR THEIR SPECIFIC VEHICLE VIA A VARIABLE MESSAGE SIGN

- The DTSW Project seeks to reduce the severity and frequency of downgrade truck accidents by
  - Increasing driver awareness of safe downhill speeds
  - Increasing driver compliance with the downhill speeds provided to them

- The system is installed and operational west of the Eisenhower Tunnel on I-70, approximately 50 miles west of Denver, CO

- For trucks, the DTSW System will:
  - Weigh and classify each vehicle using Weigh in Motion (WIM) and Automatic Vehicle Classification (AVC) technology
  - Calculate a safe speed based on vehicle type, weight, road grade and road condition
  - Display on a Variable Message Signs (VMS) a message recommending a safe speed

THE DTSW SYSTEM WILL WEIGH AND CLASSIFY EACH TRUCK, AND CALCULATE AND DISPLAY A SAFE DOWNHILL SPEED. THE DOWNSTREAM SENSORS WILL CHECK VEHICLE COMPLIANCE WITH THE DISPLAYED SPEED

Computer/RF Modem

PARKING AREA

Tunnel Control Facility

1-1/2 Miles

Westbound I-70
(12 miles of 6-7% Downgrade)

West Portal
Eisenhower Tunnel

XX MPH
Trucker Gear Down

Variable Message Sign Display

Variable Message Signs

Vehicle Sensor Loops

Peizo Weigh-In-Motion Sensors
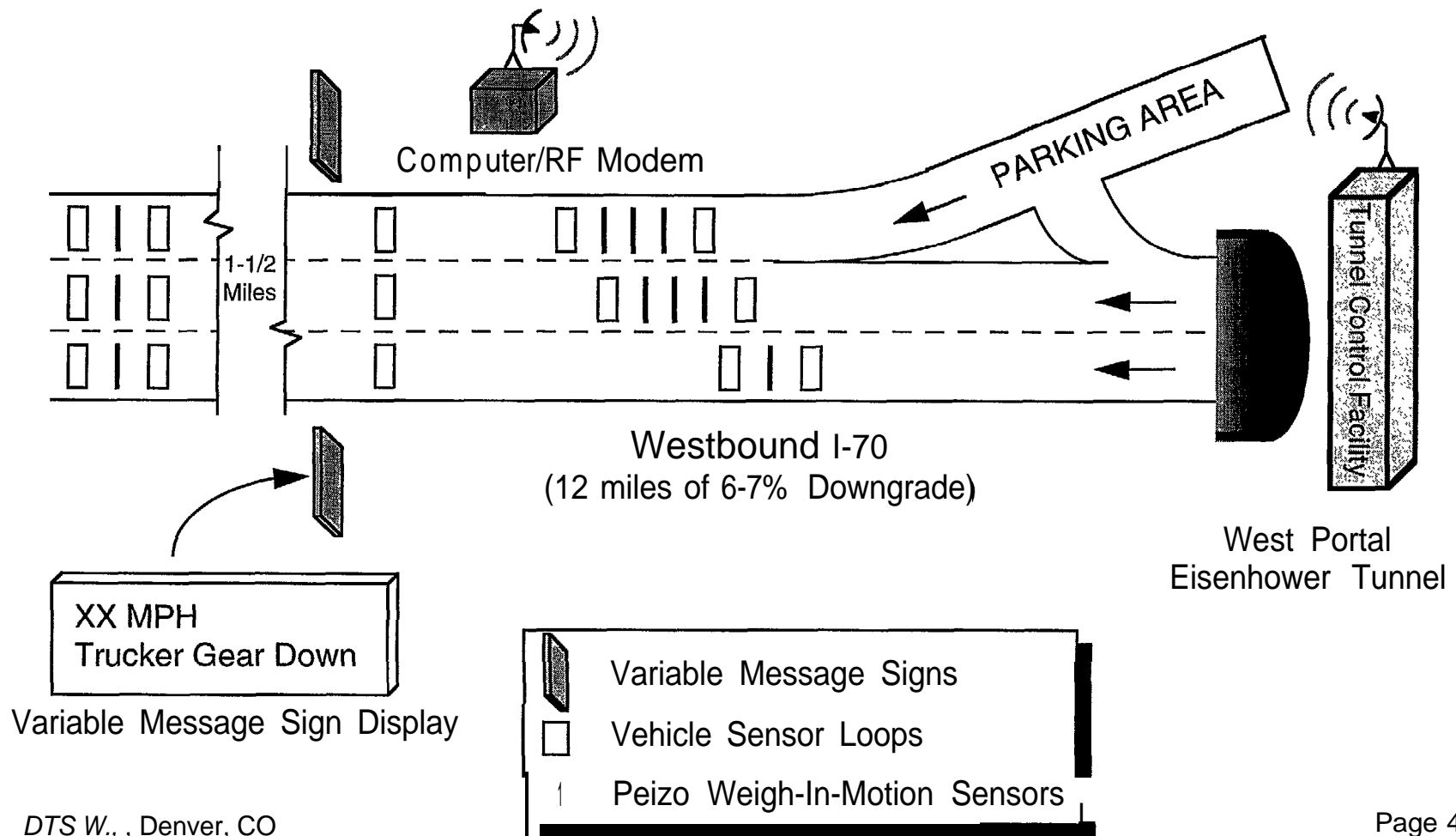
DTSW HAS DEPLOYED INTEGRATED SYSTEMS TO IMPROVE SAFETY ON COLORADO'S MOUNTAIN HIGHWAYS

SYSTEMS	SERVICES
Weigh in Motion (WIM) Automatic Vehicle Classification (AVC) Variable Message Signs (VMS)	Speed Advisory-Truck drivers are provided with a real-time, vehicle-specific, recommended safe truck speed message

THE PROJECT TEAM IS LED BY THE COLORADO DOT-THE EVALUATION WILL BE MANAGED BY THE UNIVERSITY OF COLORADO AT DENVER

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                              ┌─────────────────┐
                              │      FHWA       │
                              └────────┬────────┘
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              ┌────────────────────────┴──┐         ┌──────────────────────┐
              │     Project Manager        │─────────│  Evaluation Manager  │
              │──────────────────────────  │         │──────────────────────│
              │     CDOT/D. Mango          │         │    CU Denver/S. Khan  │
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┌──────────────────┐      ┌──────────────────┐      ┌───────────────────────────────┐
│ System Development│      │    Education     │      │          Evaluation           │
│──────────────────│      │──────────────────│      │───────────────────────────────│
│      CDOT         │      │      CDOT        │      │          CO Denver            │
│ International Road│      │  Colorado Motor  │      │            CDOT               │
│    Dynamics       │      │  Carriers Assoc. │      │ Colorado Dept. of Public Safety│
│                   │      │                  │      │ Colorado Port of Entry Division│
└──────────────────┘      └──────────────────┘      └───────────────────────────────┘
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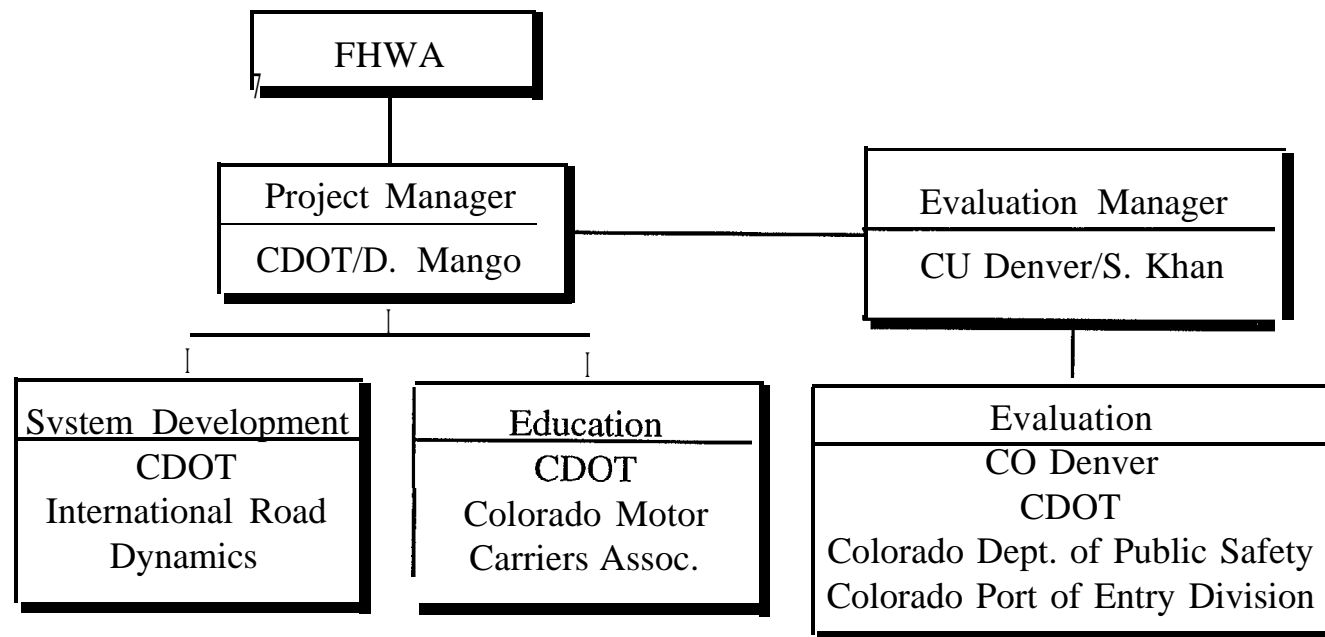
THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can downhill warning reduce the frequency of runaway trucks?
- Does a vehicle specific message increase driver compliance with speed advisories?

EVALUATION GOALS AND OBJECTIVES:

GOALS	OBJECTIVES
Assess the technical operation of the DTSW system	• Assess the accuracy of the system in calculating vehicle speeds • Assess the accuracy of the svstem in determining vehicle classification • Assess the accuracy of the system in determining vehicle weight • Assess the reliabilitv of the svstem to display the appropriate message to each passing truck • Assess the Durability of the DTSW system
Assess Driver awareness and compliance	• Assess vehicle compliance with recommended speed • Assess driver awareness of the DTSW system

PLANNED EVALUATION ACTIVITIES INCLUDE:

EVALUATION ACTIVITY	DESCRIPTION
Videotaping	Vehicles passing the DTSW system will be videotaped. Truck data from the tape will include date and time of passage, vehicle configuration, and speed. Trucks exiting an upstream weigh station will also be videotaped to allow matching weigh stations weight data to the DTSW system weight data.
WIM, Loop Networks	The DTSW system will record each passing trucks' weight, speed, vehicle configuration, and date and time of passage. This information is recorded at both the upstream and downstream locations.
Trucker Surveys	Truckers will be surveyed at a truckstop upstream from the DTSW system location. Data from the surveys will assess drivers awareness of and perceptions about the DTSW system.

BENEFITS REALIZED TO DATE INCLUDE:

- In the 6 months since the DTSW system has been in operation, downgrade truck escape ramp use on I-70 west of the Eisenhower Tunnel has decreased, while the statewide use of escape ramps has remained relatively unchanged

THE PROJECT SCHEDULE:

Task Name	'95			1996							
	D	J	F	M	A	M	J	J	A	S	
Evaluation Plan	*										
Evaluation of Technical Operation		▬▬▬▬▬▬▬▬									
Evaluation of Driver Awareness		j		▬▬▬▬▬▬							
Draft Project Report							▬▬▬▬				
Final Project Report											

* Complete

Note: System design and installation is complete.
The above schedule pertains only to the evaluation.

U.S. Department of Transportation

Federal Highway Administration

IDAHO COMMERCIAL VEHICLE
OUT-OF-SERVICE VERIFICATION
OPERATIONAL TEST

(Idaho OOS)

Project Completion Plan

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

THE IDAHO OUT-OF-SERVICE (OOS) VERIFICATION SYSTEM IS INTENDED TO REDUCE THE NUMBER OF UNSAFE VEHICLES WHICH "RUN" FROM A CHECKPOINT BEFORE CORRECTING THEIR OOS VIOLATION

- In typical Port of Entry (POE) and weigh station operations, a commercial vehicle, or its driver, may be inspected for safety violations. These violations may result from faulty or damaged equipment (such as brakes) or driver's logs that show that the driver has driven longer than the maximum allowable time (which varies by state).

- Vehicles, or drivers, which receive an OOS violation must remain at the checkpoint until the violation is cleared. This may require driver respite, on-site repairs or that the vehicle be towed to the nearest service center.

- Since most checkpoints are not manned on a 24-hour basis, vehicles that are still at the checkpoint after it has closed have the opportunity to leave or "run" before correcting the OOS condition.

- The system being tested will maintain surveillance on OOS drivers and vehicles, and notify the Idaho State Police if there is a "runner." A kiosk, at each weigh station, will allow drivers to access the system and perform a qualified clear of an OOS order. Only an inspector can clear an OOS order absolutely.

Project Overview.. ,

THE TEST SITE IS THE EAST BOISE, ID ALONG INTERSTATE 84-THERE IS NO CONVENIENT BYPASS ROUTE
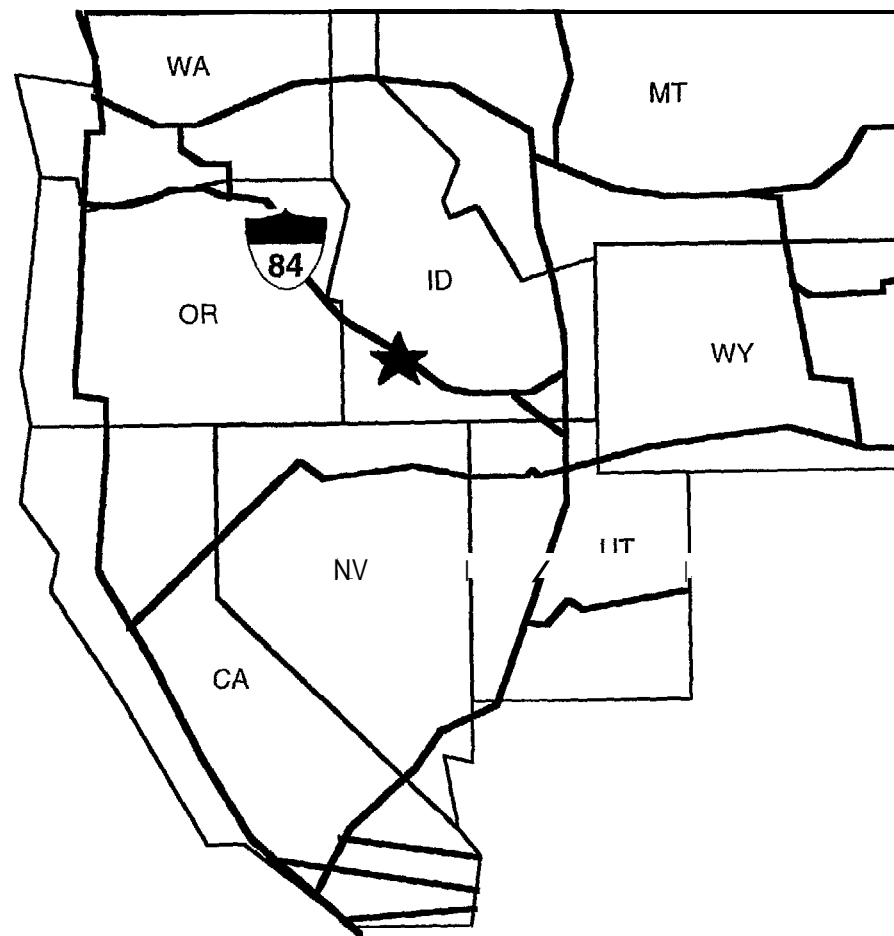
LAYOUT OF THE EAST BOISE PORT OF ENTRY AND LOCATION OF KEY OOS SYSTEM ELEMENTS
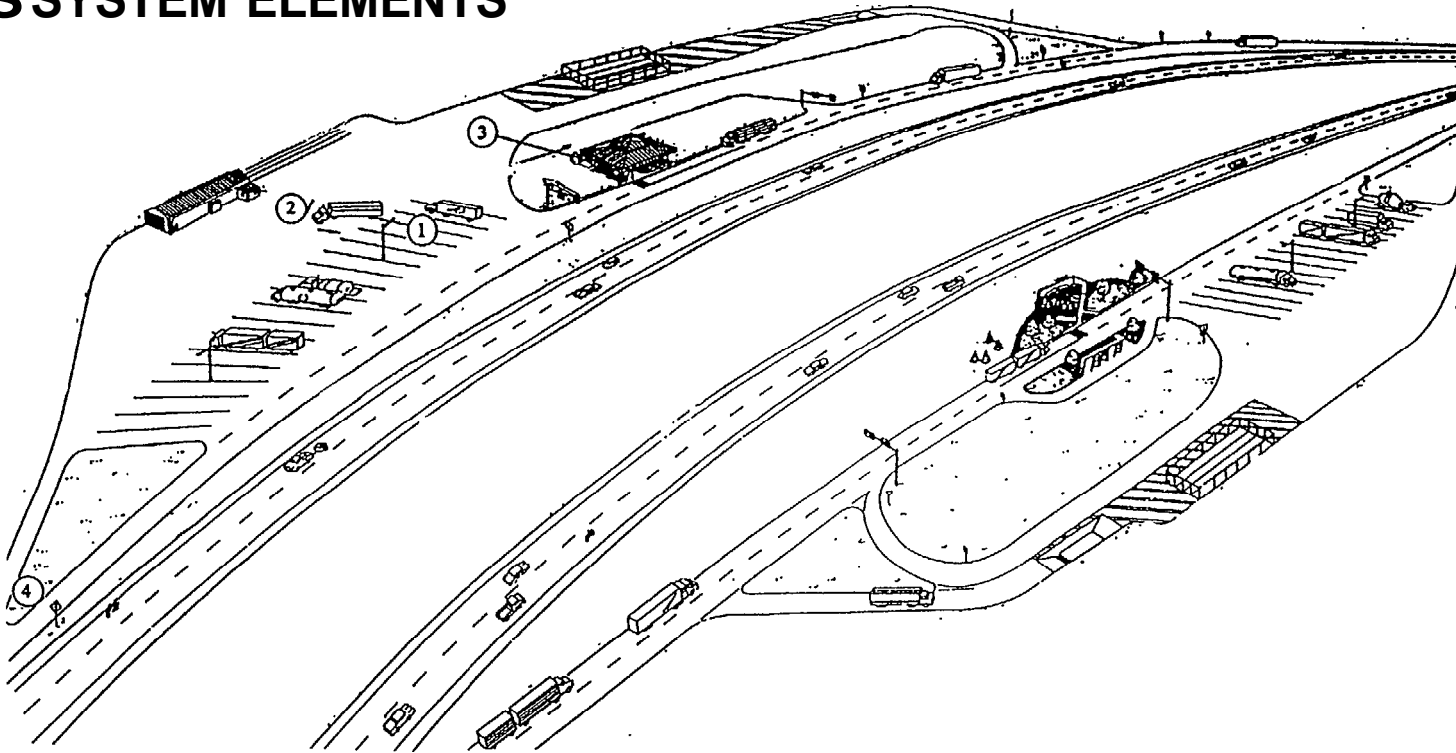
1. The inspection area where the RF sticker is attached and the AVI tag is issued and encoded. Data is entered into LI via PBIS

2. First check-point. An image is captured of the OOS vehicle using a VVIS unit and the AVI card is read simultaneously.

3. Kiosk location for clearing of violations and interaction with local intelligence. AVI cards allow access and identify driver with vehicle. Operator will have access to traveler information from the Internet.

4. Final check-point. The second VVIS unit identifies out of service vehicles exiting port. LI checks for authorization to leave. Information is faxed to Idaho State Police to determine response if any.

IDAHO OOS WILL DEPLOY SEVERAL SYSTEMS TO PROVIDE OOS ENFORCEMENT

SYSTEMS
Video Vehicle Identification Svstem (WIS)
Local Intelligence (LI)/Kiosk
Two-dimensional Tamperproof Barcode Sticker
AVI Cards
Pen Based Inspection Svstem (PBIS)

SERVICES
Out-of-Service Enforcement - Inspectors will have electronic monitoring and enforcement capabilities when the POE is manned and unmanned. It will provide 24-hour information on the status of vehicles that have been impounded. This will help ensure that the vehicles do not reenter the transportation svstem before they have resolved the OOS condition(s).

Organization.. .

THE PROJECT TEAM IS LED BY LED BY IDAHO STATE POLICE AND IDAHO NATIONAL ENGINEERING LAB - THE EVALUATION WILL BE MANAGED BY THE UNIVERSITY OF IDAHO:

PROJECT PARTNERS

Idaho State Police (ISP)
Idaho National Engineering
  Lab (INEL)
Hughes Missile Systems
  Company (HMSC)
Idaho Transportation Dept.
  (ITD)

PROJECT MANAGEMENT

ISP/S. DeKlotz
INEL/R. Allemeier

PROJECT OVERSIGHT

FHWA

EVALUATION MANAGER

University of Idaho/Michael Kyte

SYSTEM INTEGRATOR

INEL
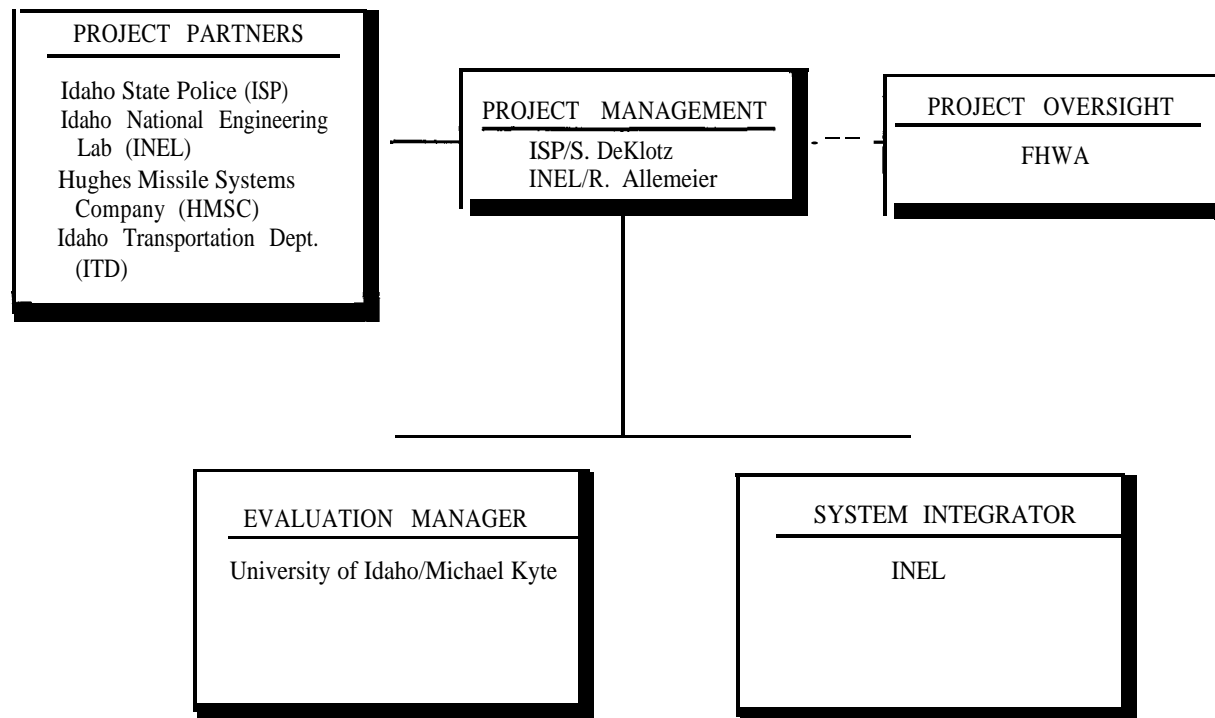
THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can automated electronic enforcement practices for commercial vehicles improve overall compliance rates?

- Can electronic enforcement improve efficiency and effectiveness of inspection staff?

- Is out-of-service electronic enforcement a viable function that will promote the advancement of automated weigh stations?

THE EVALUATION GOALS AND OBJECTIVES ADDRESS SYSTEM PERFORMANCE, USER ACCEPTANCE AND COSTS.

GOALS	OBJECTIVES
Assess the performance of the system and its components	• Assess the reliability, maintainability, and accuracy of the AVI tag . Assess the reliability, maintainability, and accuracy of the Hughes Video Vehicle Identification System (VVIS) . Assess the reliability, maintainability, and accuracy of the kiosk unit . Assess the reliability, maintainability, and accuracy of the communications and local intelligence equipment • Assess the performance of the system as a whole as implemented in the operational test
Assess user acceptance	• Assess driver/carrier acceptance • Assess Idaho State Police/Port of Entry operator acceptance - Estimated gain/loss of time per inspection (by extension, monetary impact of new system)
Evaluate system costs	. Assess the cost of the AVI tag system (fixed and variable, one-time, and on-going) • Assess the cost of the VVIS (fixed and variable, one-time, and on-going) • Assess the cost of the kiosk (fixed and variable, one-time, and on-going) • Assess the cost of the communications and local intelligence equipment (fixed and variable, one-time, and on-going)

THE EVALUATION WILL FOCUS PRIMARILY ON PERFORMANCE, USER ACCEPTANCE AND COST

EVALUATION ACTIVITIES	DESCRIPTION
Unit Test	Evaluation will be conducted several communication points. Unit testing staff will at the site throughout the testing. The actual tests are the appraisals of individual system components, with regards to accuracy, reliability, and complexity
Integration Test	Integration testing will cover the full testing span, with POE staff using the OOS system as if it were in production. The will report any incidents - failures of the system components to interact correctly, or failures of the components to mesh with the inspection process - to the project team. These will be evaluated on a case-by-case basis to determine the proper actions.
Institutional Test	The institutional test is the assessment of the system's overall impact, and will evaluate user acceptance. This will be accomplished through the use of surveys for drivers, carriers, ISP personnel, and POE personnel.

BENEFITS REALIZED TO DATE INCLUDE:

- None to report at this time

THE PROJECT SCHEDULE:

ID	Task Name	SIOINID	1995 JIF]MIAIMIJIJIAISIOIN]D	1996 JIFIMIAIMIJIJIAIS¡OINiD	1997 JIFIMIAIMIJ~J~AIS
1	Test/Study Initiation				
2	System Design/Implementation				
3	System Shakedown				
4	**Field Evaluation**				
5	Develop Evaluation Plan				
6	Develop Test Plan(s)				
7	Data Collection and Analysis				
8	Final Report				

U.S. Department of Transportation
Federal Highway Administration

MIDWEST STATES ELECTRONIC CREDENTIAL ONE-STOP OPERATIONAL TEST

(Midwest 1 -Stop)

Project Completion Plan

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

MIDWEST ELECTRONIC ONE-STOP IS ONE OF THREE OPERATIONAL TESTS EXAMINING THE USE OF AN ELECTRONIC CREDENTIAL APPLICATION AND ISSUANCE SYSTEM FOR COMMERCIAL MOTOR VEHICLES

- The main goal of the operational test is to design and test a simple, easily deployable, low cost one-stop electronic system for the purchase of motor carrier credentials.

- The resulting system will make it possible for a motor carrier to apply for, pay for and receive all the necessary credentials or permits electronically from either a base state or the "trip" specific states.

- The system will be designed to be upwardly and downwardly compatible with existing systems and preferred business practices at all participating carriers and state agencies.

- The system developer, AAMVAnet, plans to put in place a system that combines enhanced data entry for credential application information, with a means of automated transfer of data between existing state and carrier system databases, using software designed to route information between the two systems.

- With the possible exception of Single State Registration System (SSRS), current processes used for credential review and approval will remain in effect (i.e., application review and approval will not be automated during this operational test).

THE MIDWEST ONE-STOP PROJECT INVOLVES EIGHT MIDWESTERN STATES

THE ARCHITECTURE IS FAIRLY SIMPLE, USING WELL-ESTABLISHED INFORMATION AND COMMUNICATIONS TECHNOLOGIES
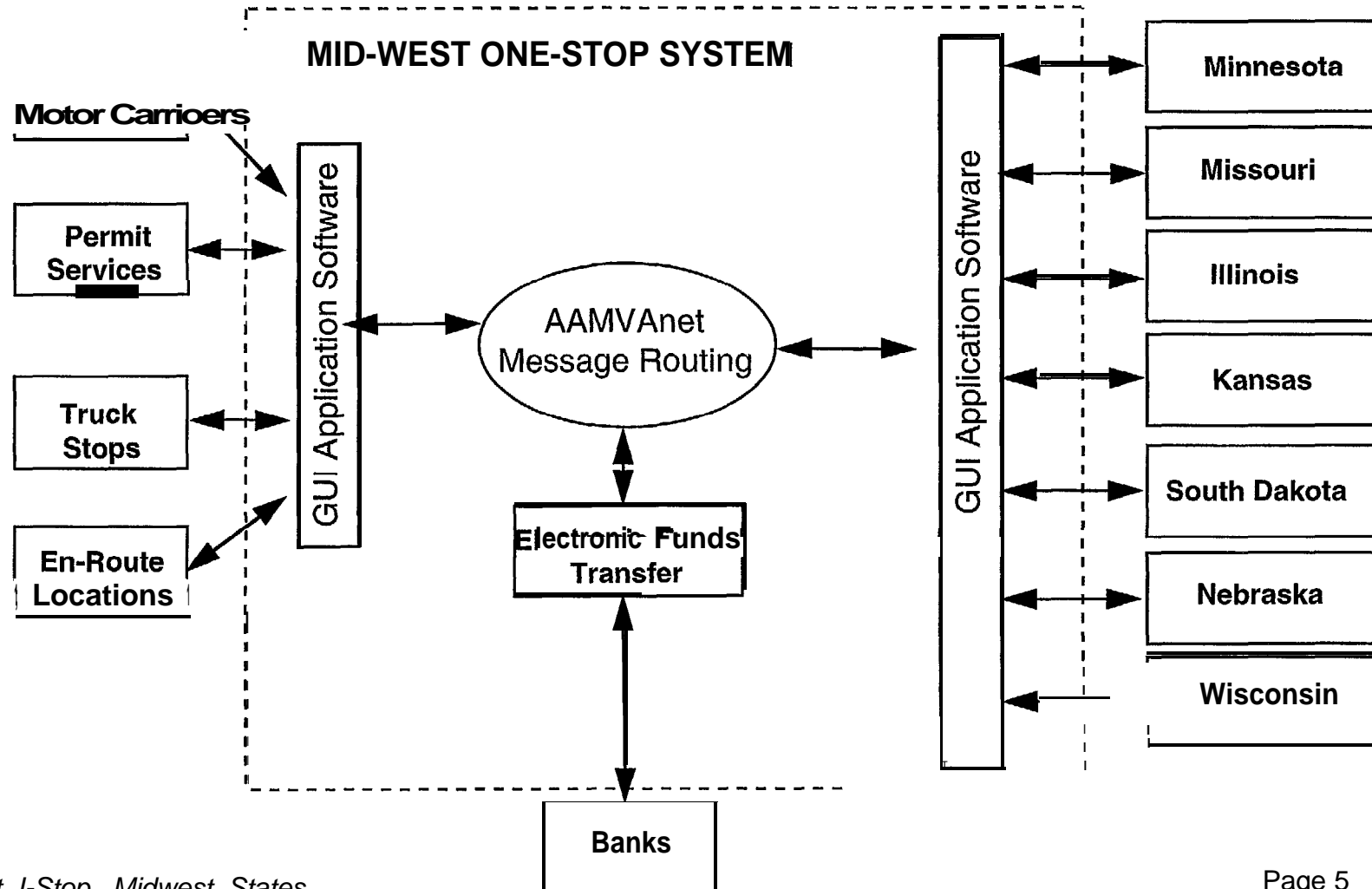
THE AAMVAnet SYSTEM WILL ROUTE INFORMATION BETWEEN PARTICIPATING STATE AGENCIES AND CARRIERS, AND WILL EMPLOY A GRAPHICAL USER INTERFACE FOR EASE OF DATA ENTRY AND TRANSFER

Systems	Services
AAMVAnet Software and Value Added Network • Graphical User Interface (GUI) • Electronic Funds Transfer • Information Routing	Automated Credential Data Input and Transfer to enhance the efficiency of the credential and permit application, payment, and response process

THE TEST WILL SUPPORT FOUR CREDENTIAL CATEGORIES

Participating State	Credential Type			
	IFTA	IRP	SSRS	OS/OW
Minnesota	X	X	X	X
South Dakota				X
Wisconsin				X
Illinois			X	X
Missouri	X	X	X	X
Kansas	X	X*		X
Nebraska	X	X	X	X
Iowa (Advisory Role Only)				

* Denotes limited participation
Note: Motor carriers are participating to the level of the state in which they are based

THE PROJECT TEAM IS LED BY IOWA STATE UNIVERSITY-THE EVALUATION WILL BE MANAGED BY NORTH CAROLINA A&T UNIVERSITY
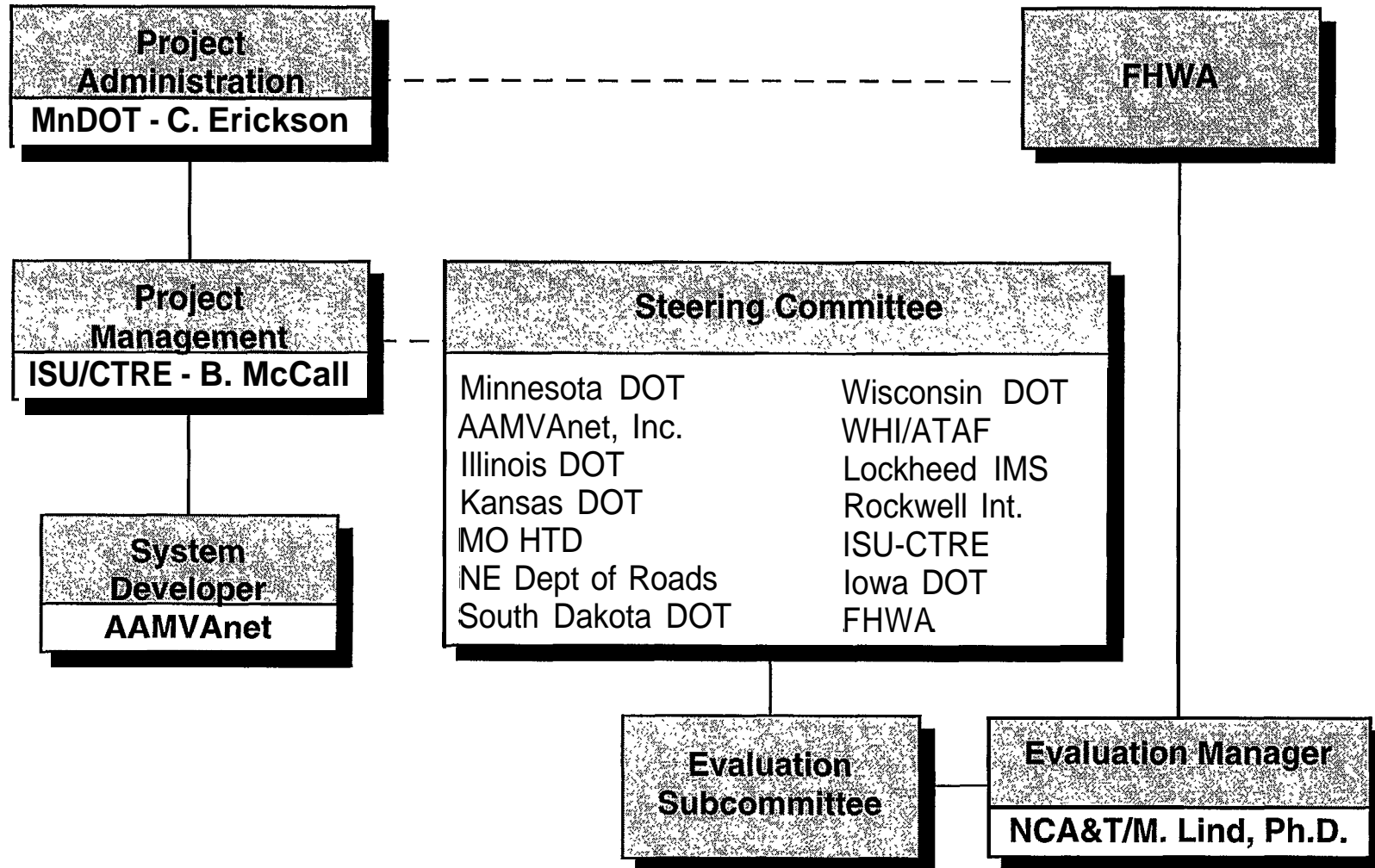
Project Administration
MnDOT - C. Erickson

FHWA

Project Management
ISU/CTRE - B. McCall

System Developer
AAMVAnet

Steering Committee

Minnesota DOT	Wisconsin DOT
AAMVAnet, Inc.	WHI/ATAF
Illinois DOT	Lockheed IMS
Kansas DOT	Rockwell Int.
MO HTD	ISU-CTRE
NE Dept of Roads	Iowa DOT
South Dakota DOT	FHWA

Evaluation Subcommittee

Evaluation Manager
NCA&T/M. Lind, Ph.D.

THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can the implementation of a One-Stop shopping system for the management of the commercial vehicle credential process result in improvements in the convenience, timeliness, and consistency of applying for and receiving credentials?

- Will motor carriers and state agencies accept the concept of electronic one-stop shopping services?

- Can the institutional issues involved in the implementation and use of a paperless credentialing method be overcome?

THE EVALUATION GOALS AND OBJECTIVES:

Goals	Objectives
Determine lmorovements in aroductivitv provided by the One-Stop system	- Determine improvements in consistency of credential administrative processes with One-Stop · Determine improvements in uniformitv of credential administrative processes provided by One-Stop · Compare credential application-to-issuance cycle time of the One-Stop svstem to the current system · Determine perceived improvements in convenience using One-Stop · Determine carrier productivity improvements using One-Stop · Assess ease of use of One-Stop as compared to the existing system
Determine market/user impacts of the One-Stop system	· Assess state agency acceptance of One-Stop as a deployed system · Assess motor carrier acceptance of One-Stop as a deployed system
Assess aotential of and reauirements for One-Stop deployment	· Determine minimum configuration reauired for a carrier and/or service provider to access and use the One-Stop system on a deployed basis · Determine minimum configuration reauired for a state agency to access and use the One-Stop system on a deployed basis · Estimate capital cost reauirements for state agencies. and carriers/service providers to access and use the One-Stop system on a deployed basis · Estimate fixed operating costs for state agencies, and carriers/service providers to access and use the One-Stop system on a deployed basis · Document state agency and motor carrier training efforts during the test · Estimate state agency and motor carrier training efforts required for deployment
Document and assess institutional issues, reauirements and solutions that surface durina. or as a result of One-Stop	· Assess state agency position on deployment of One-Stop · Assess motor carrier position on deployment of One-Stop · Maintain a librarv of contracts. aareements. and documents which address solutions to legal, societal, jurisdictional and privatization issues
Determine svstem suitabilitv as appropriate for the One-Stop test	· Determine upward and downward comoatibilitv of One-Stop Svstem with existina agency business practices · Determine availability of One-Stop from a motor carrier perspective

PLANNED EVALUATION ACTIVITIES INCLUDE:

Evaluation Activity	Description
Credential Tracking	• Prior to One-Stop imulementation. carrier and agency personnel will use tracking sheets as routing forms to gather information regarding application preparation time. cycle time. and other credential processing details - After One-Stop implemetation, the system will track and record information during the credentialing: process
User Surveys	- Survevs of motor carrier administrative personnel who initiate credential applications with state agencies. The obiective is to determine attitudes and perceptions of the business practice impacts of electronic one-stop • Survevs of state agency regulatory personnel who receive, process and apurove credential applications. The obiective is to determine state agency attitudes and perceptions of the business practice impacts of electronic one-stop
Interviews/Focus Groups	• Interviews and focus groups will be used to clarify survey responses, and to gather additional, detailed subjective data regarding the viability of One-Stop as a deployed system

THE PROJECT SCHEDULE:

TASK	1995 J FM AMJ J AS OND	1996 J F M A MJ J A S ON	1997 DJ FM A MJ J AS 0 ND
PROJECT KICK-OFF	◆		
SYSTEM DESIGN			
EVALUATION PLAN			
EVALUATION DESIGN			
BASELINE DATA			
SYSTEM INSTALL			
OPERATIONAL TEST			
DATA ANALYSIS			
FINAL REPORT			◆
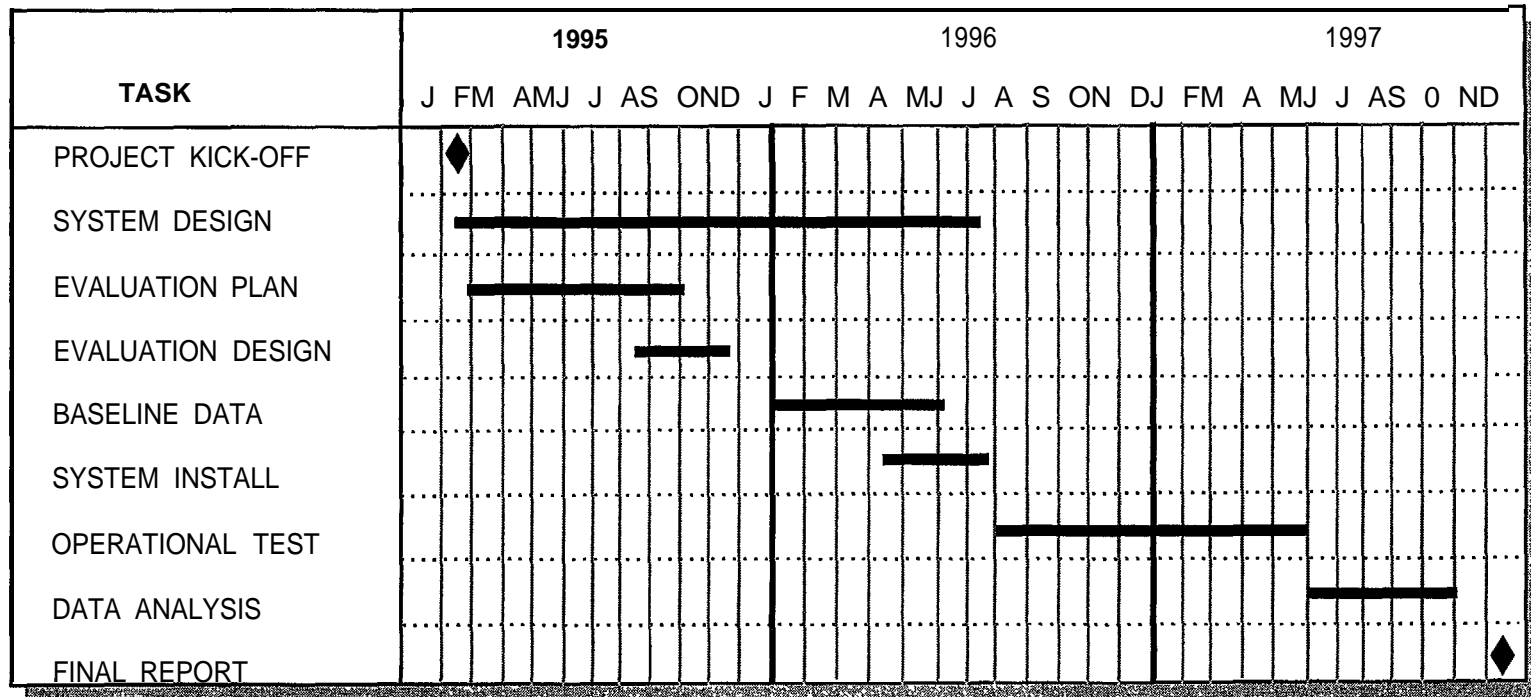
U.S. Department of Transportation
Federal Highway Administration

SOUTHWEST ELECTRONIC ONE-STOP SHOPPING FIELD OPERATIONAL TEST

(EOSS)

Project Completion Plan

ITS Operational Test Program

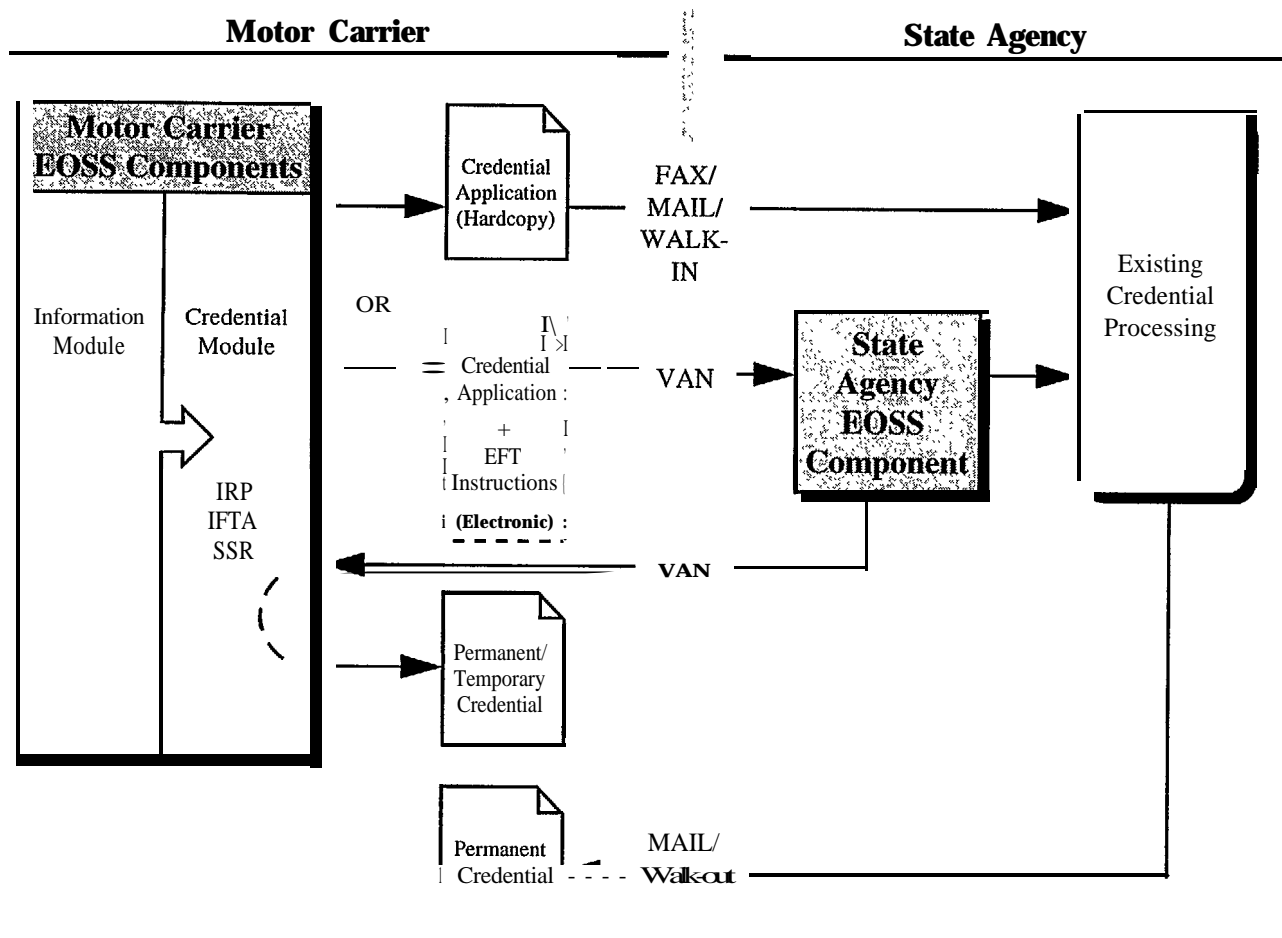**February 5,1996**

CONTENTS

- Project Overview

- Organization

- Evaluation Overview

- Schedule

THE SOUTHWEST ELECTRONIC ONE-STOP SHOPPING (EOSS) TEST IS ONE OF THREE OPERATIONAL TESTS EXAMINING THE USE OF AN ELECTRONIC CREDENTIAL APPLICATION AND ISSUANCE SYSTEM FOR COMMERCIAL MOTOR VEHICLES

- The EOSS is expected to increase productivity for the motor carrier industry and the state regulatory administrations by automating and integrating common motor carrier administrative functions

- The objectives of the project are:
  - To streamline the credentialing administrative process through the use of an expert system
  - To reduce the public and private sector work load associated with the credentialing application process
  - To reduce the cycle time for issuance of permanent credentials
  - To improve the consistency and uniformity of issuing credentials and assessing fees
  - To extend the availability of the system by providing 24-hour access
  - To expand the geographic availability of credentialing and other operational information
  - To ensure all motor carriers, regardless of size or type of operation, have uniform access to One-Stop Shopping
  - To accommodate state-specific regulatory needs

- The project is being conducted in Colorado, Arkansas, and Texas

THE EOSS SYSTEM WILL PROVIDE A USER-FRIENDLY, HIGHLY GRAPHICAL COMPUTER SYSTEM THAT WILL IDENTIFY REQUIRED COMMERCIAL VEHICLE CREDENTIALS AND PROVIDE FOR THEIR ISSUANCE
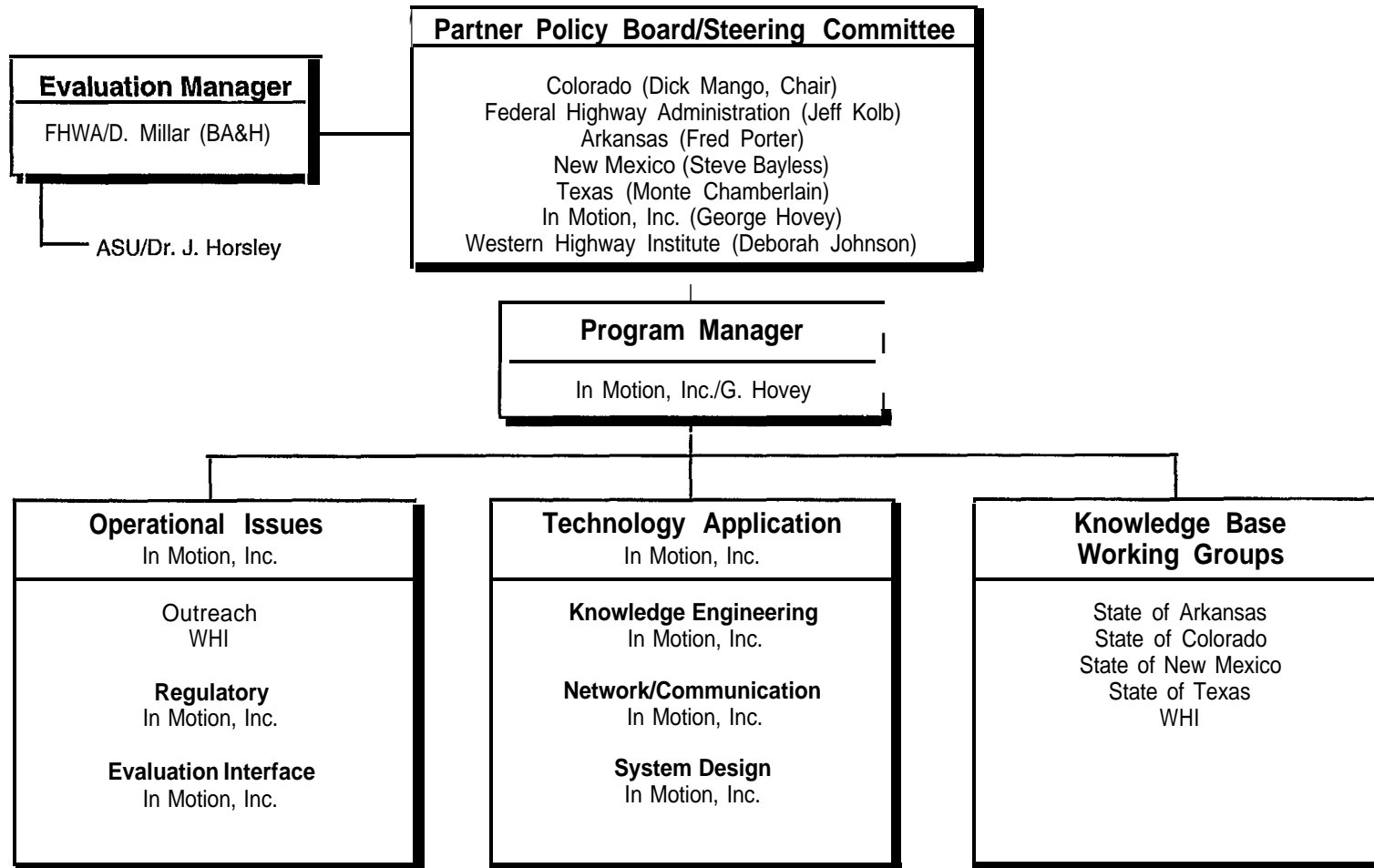
Motor Carrier   **State Agency**

Motor Carrier EOSS Components

Credential Application (Hardcopy)

FAX/ MAIL/ WALK-IN

Information Module   Credential Module

OR

Credential Application + EFT Instructions **(Electronic)**

VAN

State Agency EOSS Component

Existing Credential Processing

IRP IFTA SSR

VAN

Permanent/ Temporary Credential

Permanent Credential

MAIL/ Walk-out

MULTIPLE INTEGRATED SYSTEMS ALLOW THE EOSS SYSTEM TO PROVIDE ELECTRONIC PURCHASE AND ISSUANCE OF MOTOR CARRIER CREDENTIALS

SYSTEMS	SERVICES
• EOSS Software Information Module • EOSS Software Credential Module • Value Added Network (VAN) · Electronic Data Interchanges (EDI) · Electronic Fund Transfers (EFT)	• Provides information to motor carriers about what credentials are required in each state • Assists carriers in preparation of International Fuel Tax Agreement (IFTA), International Registration Plan (IRP), and Single State Registration (SSR) credential applications, including error checking. Also allows carriers to print out temporary or, in some cases, permanent credentials at the location desired by motor carriers • facilitates EDI and EFT, and allows submittal of credential applications electronically • Sends credential application information directly to state agency data bases • Identifies fees and arranges for electronic funds transfer to pay the fees

THE PROJECT TEAM IS LED BY COLORADO DOT AND IN MOTION, INC. AND THE EVALUATION WILL BE MANAGED BY FHWA

Partner Policy Board/Steering Committee

Evaluation Manager

FHWA/D. Millar (BA&H)

ASU/Dr. J. Horsley

Colorado (Dick Mango, Chair)
Federal Highway Administration (Jeff Kolb)
Arkansas (Fred Porter)
New Mexico (Steve Bayless)
Texas (Monte Chamberlain)
In Motion, Inc. (George Hovey)
Western Highway Institute (Deborah Johnson)

Program Manager

In Motion, Inc./G. Hovey

Operational Issues
In Motion, Inc.

Outreach
WHI

Regulatory
In Motion, Inc.

Evaluation Interface
In Motion, Inc.

Technology Application
In Motion, Inc.

Knowledge Engineering
In Motion, Inc.

Network/Communication
In Motion, Inc.

System Design
In Motion, Inc.

**Knowledge Base
Working Groups**

State of Arkansas
State of Colorado
State of New Mexico
State of Texas
WHI

THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Can the implementation of a one-stop shopping system for the management of the commercial vehicle credential process result in improvements in the convenience, timeliness, and consistency of applying for and receiving credentials?

- Will motor carriers and state agencies accept electronic one-stop shopping services?

- Can the institutional issues involved in the implementation and use of a paperless credentailing method be overcome?

EVALUATION GOALS AND OBJECTIVES:

GOALS	OBJECTIVES
Determine chances in nroductivitv related to EOSS svstem	• Determine imorovements in state auencv credential administrative processes with EOSS • Compare credential aonlication-to-issuance cycle times of the EOSS svstem to the current svstem • Determine state aaencv oroductivitv imorovements due to the use of EOSS • Determine motor carrier oroductivitv imorovements due to the use of EOSS • Assess EOSS user-friendliness (interoperability) from a motor carrier oersoective . Assess EOSS with EDI user-friendliness (interoperability) from a State Anencv oersoective
Determine user impacts of EOSS svstem	• Assess state aaencv acceptance of EOSS • Assess motor carrier acceptance of EOSS . Determine imorovements in convenience due to the use of EOSS perceived bv motor carriers
Assess the requirements and potential for EOSS deolovment	• Determine minimum svstem configuration* required to make EOSS available to all motor carrier operations • Determine minimum svstem configuration" required to make EOSS available to all state aaencv operations . Estimate state aaencv deolovment capital costs • Estimate state aaencv denlovment ooeratina costs • Estimate motor carrier deolovment capital cost requirements • Estimate motor carrier deelovment operating costs • Estimate state agency trainina efforts reauired for deolovment • Estimate motor carrier training efforts reauired for denlovment
Document and assess the impacts and solutions of institutional issues	• Assess state aaencv position on deelovment of EOSS . Assess motor carrier position on denlovment of EOSS • Maintain a library of contracts, anreements. and documents which address successful and unsuccessful solutions to legal. societal. iurisdictional. and orivatization issues
Determine EOSS svstem suitabilitv	• Determine compatibility of EOSS svstem with existina aaencv credential approval criteria • Determine availabilitv of EOSS svstem from a motor carrier perspective . Determine the processing abilitv of EOSS svstem on various computer hardware and software platforms
Assess svstem component performance	• Assess the performance of the credential module • Assess the utilitv of the information module • Assess the functionality of the EDI

*Configuration needed to support the requirements of the commercial vehicle user services in the ITS National Program Plan

PLANNED EVALUATION ACTIVITIES INCLUDE:

Evaluation Activity	Description
System Records	Collect operational data (eg.. number and cvcle-time of transactions) manuallv or automatically from Motor Carrier and State Asencv users about the EOSS svstem. Data will be recorded continuously and collected periodically throughout the Data Collection and Analysis Phase.
User Surveys/ Information Request	Collect operational data (e.g., record reiection rates) plus behavioral and attitudinal data (e.g.. svstem preference and ease of use) from motor carrier and state aaencv users.
User Interviews	Probe the motor carrier and state aaencv user's responses to survev behavioral and attitudinal auestions (e.g.. Whv was the svstem not compatible?). Also Provides user perceptions reaardinq operational data (e.g.. cycle times, costs. confiauration reauirements). Institutional issues will also be discussed.
Observation	The evaluator will observe the Motor Carrier's and State Aaencv's use of the svstem to verifv svstem reauirements and performance. collect baseline information reaardina existina processes, and perform aualitv assurance reaardina survev data recording protocol.
Simulation	Test the EOSS svstem's processing abilitv (e.g. speed) on various hardware and software platforms.
Research	The evaluator will collect recorded historical operational data (e.g.. reiection rates, orocessina times), operational test cost data, and confiauration reauirements from motor carriers, state agencies, IMI, and other project participants.

Schedule.. .

THE PROJECT SCHEDULE:

TASK	Qtr 4, 1995			Qtr 1, 1996			Qtr 2, 1996			Qtr 3.1996		
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Pre-Test Activities												
Recruit Motor Carriers												
Install EOSS at Carriers/Associations												
Motor Carrier EOSS Training												
Develop Training												
Conduct Training												
Develop Simulation Data Package												
Data Collection Training												
Pilot Test												
Finalize Surveys and Logs												
Test Conduct Activities												
Data Collection												
Arkansas, Colorado												
Complete Transaction Logs												
Conduct Research												
Conduct Simulation Runs												
Test Site Visits (observations/interviews)												
Gather Log Information												
Administer Surveys												
Texas												
Complete Transaction Logs												
Conduct Research												
Conduct Simulation Runs												
Test Site Visits (observations/interviews)												
Gather Logs												
Administer Surveys												
Post-Test Activities												
Analyze Data												
Complete Test Report												

U.S. Department of Transportation
Federal Highway Administration

WISCONSIN-MINNESOTA
OUT-OF-SERVICE OPERATIONAL TEST

(WI/MN OOS)

Project Completion Plan

ITS Operational Test Program

February 5,1996

CONTENTS

- Project Overview
- Organization
- Evaluation Overview
- Schedule

THIS TEST WILL INTRODUCE AUTOMATED REAL TIME ACCESS BETWEEN WEIGH STATIONS AND A CENTRAL DATABASE TO INFORM INSPECTORS ABOUT COMMERCIAL VEHICLES/DRIVERS THAT COULD BE OPERATING IN VIOLATION OF AN OUT-OF-SERVICE ORDER

- The system has license plate scanners in place at four inspection locations (weigh stations) along a 252-mile corridor of I90/94 in Wisconsin.

- Data from the scanners is compared with the current OOS vehicle databases using specially designed software, MCSAP Out-Of-Service Enforcement (MOOSE), on a PC at each weigh station. When a match is found, the PC sounds an alarm to inform the inspectors.

- OOS commercial vehicles from both states can be identified through this system creating a bi-state program of enforcement.

- The test will also provide data to extrapolate the potential for expansion of out-of-service functions to encompass all of Wisconsin and neighboring states as well as increasing the functionality of this system.
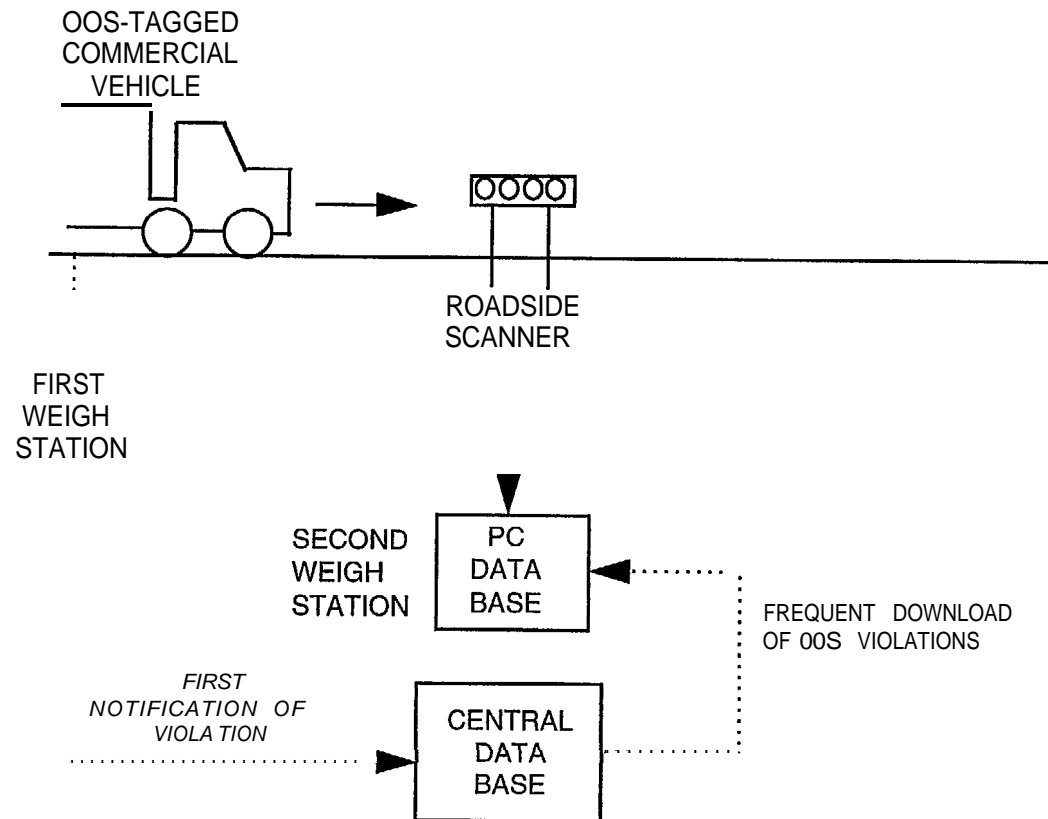
Project Overview.. .

THE TEST AREA SPANS THE I-90/94 CORRIDOR BETWEEN BELOIT, WISCONSIN, AND THE ST. CROIX WEIGH STATION ON THE MINNESOTA BORDER (EAST OF ST. PAUL)

MINNESOTA

WISCONSIN

ST. CROIX
STATION

EAU CLAIRE

90

94

MADISON
MILWAUKEE
BELOIT
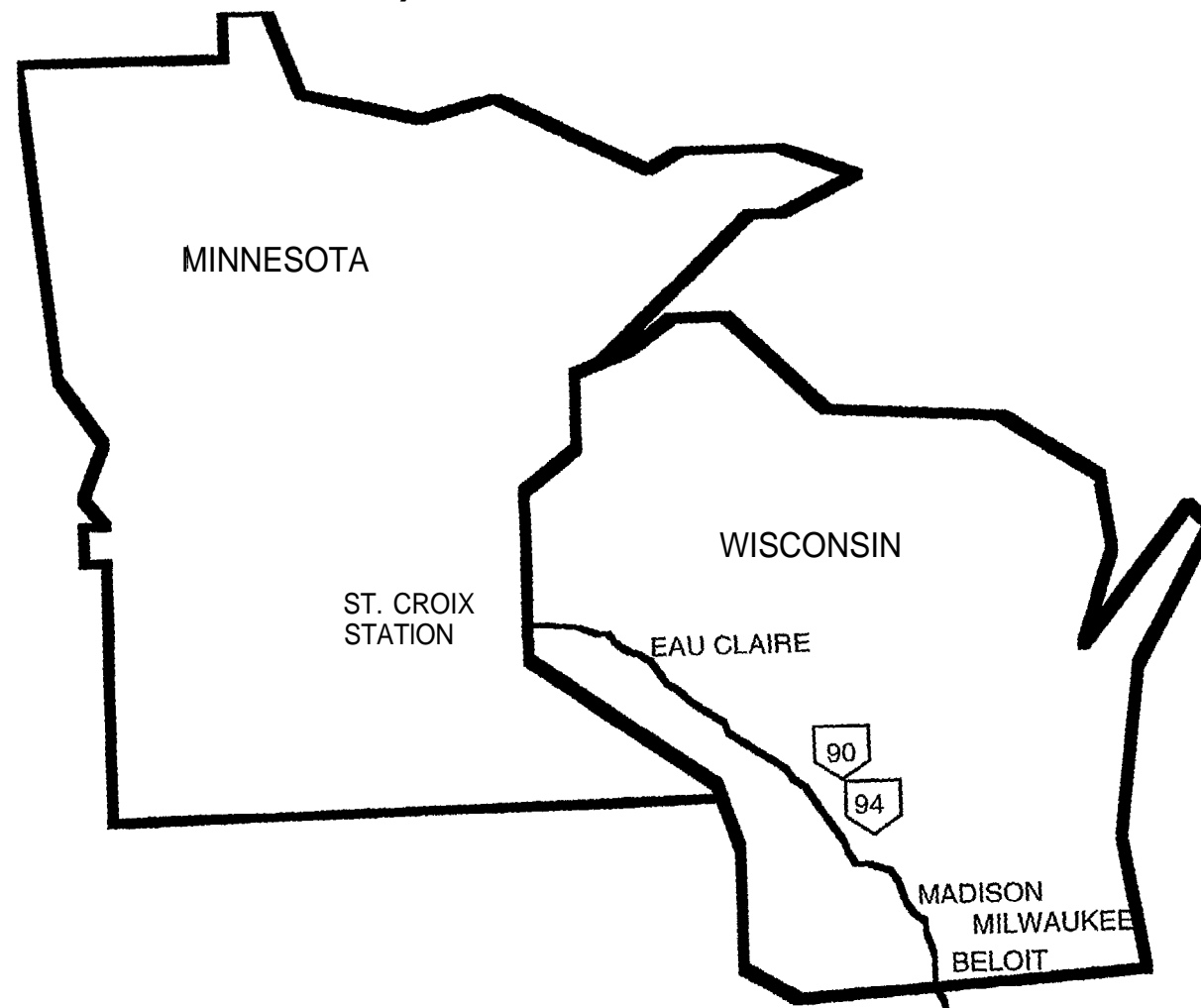
THE SYSTEM IDENTIFIES THE VEHICLE AND CHECKS FOR OOS VIOLATIONS AS THE VEHICLE MOVES THROUGH THE WEIGH STATION

- When a truck is tagged OOS by an inspector, the license plate is entered into a central database. The OOS violation is then included in the next regular download to the PC OOS databases at the other weigh stations. If the truck leaves the station illegally, the license plate may be scanned at the next weigh station. The inspector at the next station will be notified of the violation by the on-site PC.

SYSTEM DIAGRAM

OOS-TAGGED
COMMERCIAL
VEHICLE

ROADSIDE
SCANNER

FIRST
WEIGH
STATION

SECOND
WEIGH
STATION

PC
DATA
BASE

FREQUENT DOWNLOAD
OF OOS VIOLATIONS

*FIRST
NOTIFICATION OF
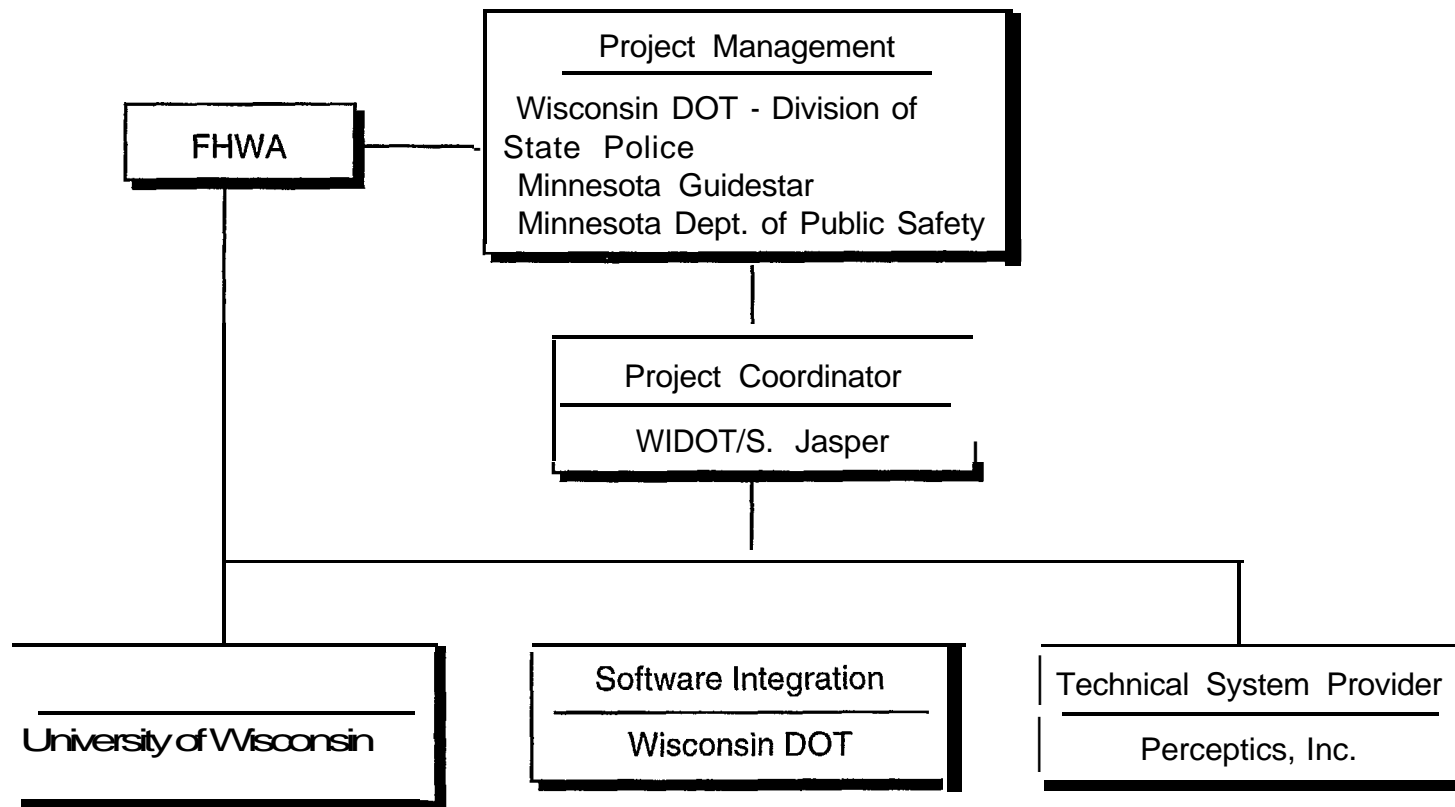VIOLA TION*

CENTRAL
DATA
BASE

THIS TEST WILL DEMONSTRATE THE INTEGRATION OF REMOTELY OPERATED, CENTRALLY CONTROLLED COMMERCIAL VEHICLE DATA THAT IS SUPPORTED BY ELECTRONIC READ TECHNOLOGY

SYSTEMS	SERVICES
Real-time Data Link	OOS enforcement-Inspectors at weigh-stations down-line from the initial OOS tag will have on-site access to the current status of OOS vehicles and drivers via frequent downloads from the central database. All vehicles placed OOS anywhere in Wisconsin will be identified.
Fixed-site Image Scanners Linked to On-site PC Database	Automated Vehicle Identification-Scanners will automatically read license plates of trucks approaching down-line weigh station
Mobile Image Scanner	By-pass Identification-Mobile systems placed on by-pass routes to detect and cite violators who try to by-pass the next weigh station

THE PROJECT TEAM IS LED BY WIDOT-THE EVALUATION WILL BE MANAGED BY THE UNIVERSITY OF WISCONSIN

Project Management

Wisconsin DOT - Division of State Police
Minnesota Guidestar
Minnesota Dept. of Public Safety

FHWA

Project Coordinator

WIDOT/S. Jasper

University of Wisconsin

Software Integration

Wisconsin DOT

Technical System Provider

Perceptics, Inc.

THE EVALUATION WILL ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

- Will electronic OOs enforcement improve compliance rates for commercial vehicles?

- Will the application of advanced technology allow inspectors to more effectively identify violators of commercial vehicle regulations?

EVALUATION GOALS AND OBJECTIVES:

GOALS	OBJECTIVES
Increase Effectiveness of OOS Enforcement Efforts	- Increase the number of vehicles screened for inspection · Increase the effectiveness of inspectors • Increase compliance with OOS orders · Increase direct compliance with OOS orders • Reduce delays in compliance with OOS notices
Establish a bi-state enforcement program	- Increase the detection of OOS violations between Wisconsin and Minnesota · Increase coordination between agencies across state lines • Create an efficient procedure for sharing data
Identify potential future applications	- Access national databases such as SAFETYNET · Evaluate the potential for expansion to neighboring states and all of Wisconsin/Minnesota · Measure the effectiveness of license plate scanner technology • Estimate the potential for expansion to other commercial vehicle regulatory issues, such as issues relating to IRP, IFTA, and size and weight preclearances · Identify the feasibility of collecting planning-related data • Estimate the potential for expansion to other inspection sites · Estimate the potential use in mobile weight stations

PLANNED EVALUATION ACTIVITIES INCLUDE:

EVALUATION ACTIVITY	DESCRIPTION
Pre-deploy Data	Field visits to all weigh stations to obtain baseline information on the MCSAP inspection procedures, conduct interviews with inspectors, provide MSCAP Out-Of-Service Enforcement (MOOSE) system training to the operators, and collect initial operational data, including scanner log data and video output from the scanner.
Initial Deploy Data	MCSAP data from mainframe computer database will provide the source for many evaluation MOEs. The PC-based MOOSE software log file of OOS status will provide additional evaluation MOEs. The scale operational times and station counts will also be taken. WisDOT vehicle coverage counts will be obtained for data on truck traffic at weigh stations.
Post-deployment Data	Data taken from the previous sources will be compared to initial data before deployment to determine system accuracy and impacts on the ability to identify vehicles and drivers tagged OOS.

Schedule.. .

THE PROJECT SCHEDULE:

	1995 J F M A M J J A S O N D	1996 JFMAMJJASOND	JFMAMJJASOND
System Design	▬		
System Install	▬		
System Operation	▬▬▬▬▬	▬▬	– –>
Evaluation Plan	▬▬		
Implementation - Pre-Deploy Data - Initial Deploy Data - Post -Deploy Data	▬ ▬▬▬	▬▬	
Final Evaluation Report			